ENGINEERING

Electrical World

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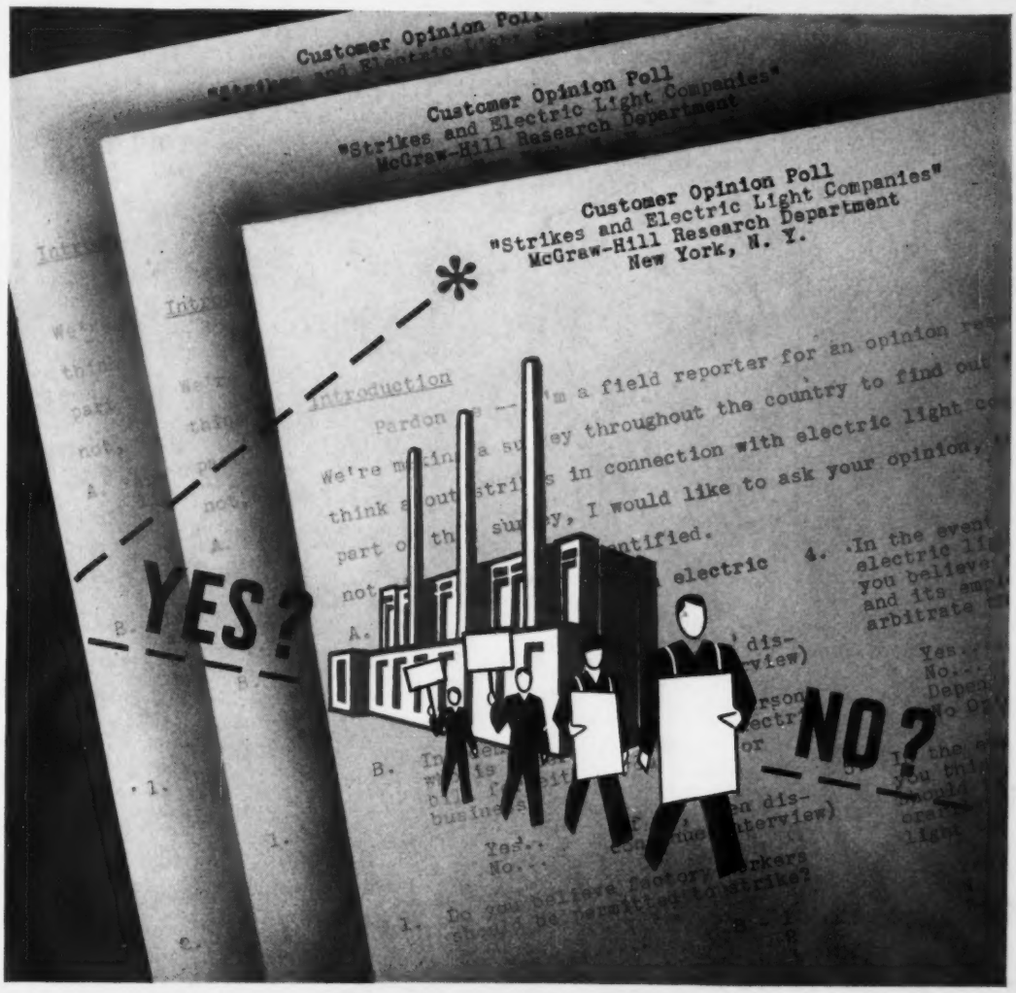

MAY 25, 1946

Customer Opinion on Strikes in Electric Utilities • History of Strikes

The Legislation Picture • Comparison of Utility Wages with Manufacturing

Extent of Unionization in Electric Utilities.

A McGRAW-HILL PUBLICATION

The Compact Instrument of Broad Utility

WESTON (MODEL 785) INDUSTRIAL CIRCUIT TESTER

(20,000 Ohms per volt-DC)
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Electrical World

FOUNDED IN 1874 • READ BY ELECTRICAL MEN FOR 72 YEARS

May 25, 1946 — Vol. 125, No. 21

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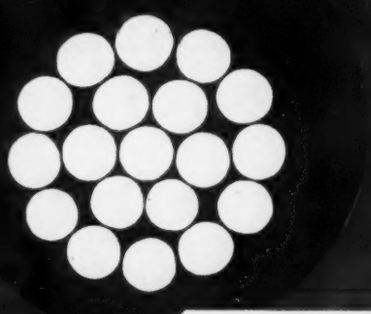

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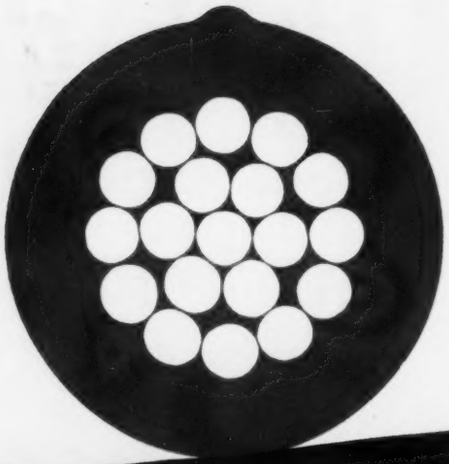

...but PERFECTLY-CENTERED Conductors the OKONITE way

Only Cables insulated with OKONITE give you all 5

1. Conductors better protected from corrosion by an Okoloy coating over the copper.
2. Long-lived insulation, made with wild Up-River Fine Para rubber, carefully washed and dried.
3. Foot-by-foot inspection of the insulation strips before and during their application to the wire.
4. Perfect centering of conductors by the Okonite strip-insulating process.
5. Greater density, uniformity and higher electrical values through vulcanization in a continuous metal mold.

Okonite's strip insulating process assures perfect centering of the conductors in electrical wires and cables. This method automatically eliminates uneven walls of insulation, removing any chance of failure from this cause.

In the Okonite process, strips of rubber compound of the exact thickness required are individually folded around the conductor, automatically centering it. The insulation is open to inspection during the entire insulating operation.

The final strip is backed by sheet tin, and when applied forms a continuous metal mold for vulcanizing. In this mold, heat is transmitted evenly through the entire length of the cable, so that every foot receives the same "cure". When the mold is removed, there remains a wall of dense, homogeneous Okonite rubber insulation that is uniform in thickness throughout.

Bulletin 101 gives you further information on the rubber used in Okonite insulation and the method of applying it. Write for a copy. The Okonite Company, Passaic, N. J.

OKONITE insulated wires and cables

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HEAVY-DUTY COUPLING

FOR SPLICING COPPER STRAND (250 to 1500 MCM)

READY NOW FOR YOUR NEW HEAVY TRANSMISSION LINES

Gives you these Big ADVANTAGES

1 **HIGH PRESSURE**—Metal to metal contact under high pressure gives ultimate electrical and mechanical strength.

2 **HIGH CONDUCTIVITY**—Its resistance is less than an equivalent length of the conductor itself.

3 **STRONGEST** TYPE OF COUPLING when used with steel, copper or composite strands.

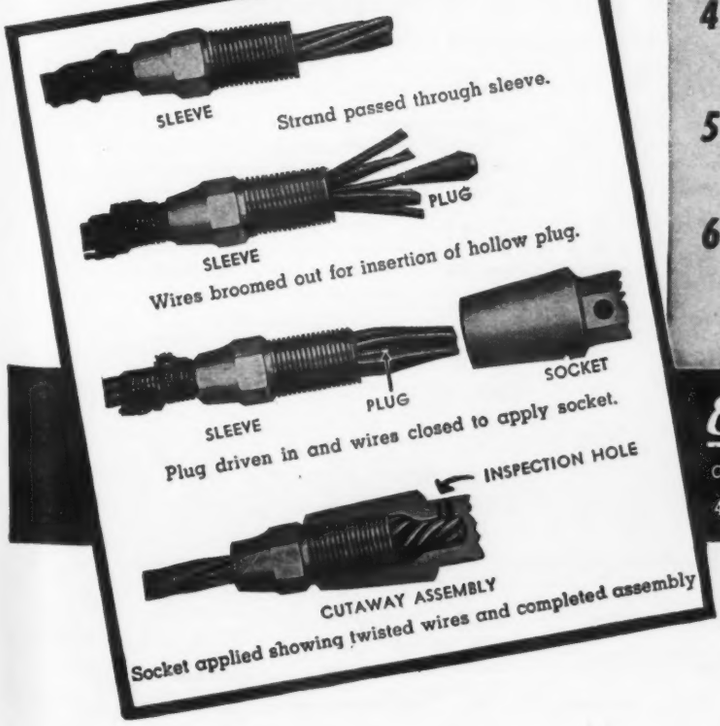
4 **NO WASTE** of conductor, in fact the coupling itself can be used over and over again. Easily disconnected . . . free from corrosion.

5 **SOLDERLESS**—No hot metal is needed. No special tools required. Common tools make or unmake the connection.

6 **EASY INSPECTION**—Inspection holes make visual inspection of the joint quick and positive. No guess work. A sound connection is certain.

SIMPLE TO INSTALL

ONLY THREE SIMPLE OPERATIONS ON EACH END—THEN THE COMPLETE JOINT



Electroline Company

Originators and Patentees of Automatic Line Splices and Dead Ends

4121 South La Salle Street Chicago, Illinois

Available in complete range of sizes from 250 MCM to 1500 MCM in straight couplings as illustrated. Also made in dead end types. *Write today for complete prices and illustrated literature.*

NOW YOU CAN "Hang the Sky" TO HELP THEM SEE BETTER

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by Wakefield

Let the STAR provide a sky of easy-eye light

Here's the answer for many of your customers. Provides all the advantages of both fluorescent and indirect light *plus simple, sturdy construction and easy maintenance.* Checked and improved by pre-testing. Unusually simple to handle and clean—Plaskon reflector section slides out like a drawer. No need to take unit apart. Ideal for office, drafting room or school. Ask for details.

It's new — THE WAKEFIELD STAR

Helps you build commercial LIGHTING LOAD

Over-ALL Lighting by Wakefield provides a new method for lighting office interiors, drafting rooms and schools. A method that makes for easier seeing *and for more business for you!*

Designed to protect eyes against strain, the new Wakefield Over-ALL Lighting method spreads soft pleasing light *over all.* Your customers will like it because this new system is based on lighting results which mean comfort plus efficiency.

And especially important to you—Wakefield equipment for Over-ALL lighting has been designed to simplify your job . . . since easy installation, easy maintenance and long-lasting service *in addition to top lighting performance* makes selling easier.

Ask your Wakefield representative to tell you how Over-ALL Lighting can work for you. The F. W. Wakefield Brass Company, Vermilion, Ohio.

Wakefield

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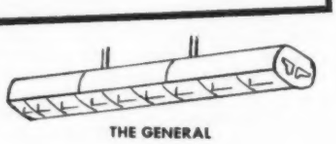
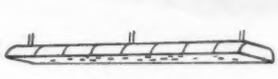


THE GENERAL



THE GRENADIER

THE COMMODORE

THE DIPLOMAT

CHECK the FACTS

UNIVERSAL TERMINAL CLAMPS

1. They combine many odd sizes of clamps for wire, cable and tubing—eliminate specifying diameters except for special conductor requirements.
2. Mounts on terminal pad with four half inch bolts on 1¾" centers.
3. Choice of clamp position doubles conductor range for each clamp. Note a 90 degree change in position can be made for quick selection of either of two indicated range sizes.
4. Overlapping sides of clamping cradle hold cable strands together.
5. Only three clamps cover full Conductor range—Wire No. 4 to 4/0, Cable No. 4 to 800 MCM, Tubing 3/8 inch to 3/4 inch.
6. Two clamps for specified conductor sizes—Cable 350 MCM to 1250 MCM, Tubing—1/2 inch 3/4 incl. and one inch.

R&IE
the
SWITCHING EQUIPMENT
Specialist

RAILWAY AND INDUSTRIAL ENGINEERING CO., GREENSBURG, PA.
IN CANADA—EASTERN POWER DEVICES, LIMITED, TORONTO

The Check List

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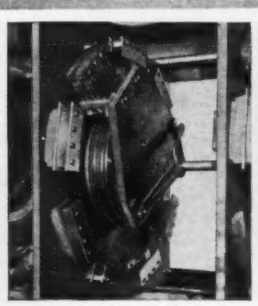
TESTING DEVICES

Allis-Chalmers Offers You:

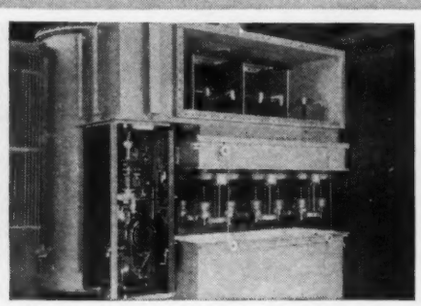
Advanced, Proven Transformer Load Ratio Control

A-C LOAD RATIO CONTROL REGULATES MORE THAN 8,000,000 KVA OF U.S. POWER

Skilled Workmen Make a Rugged Control Assembly

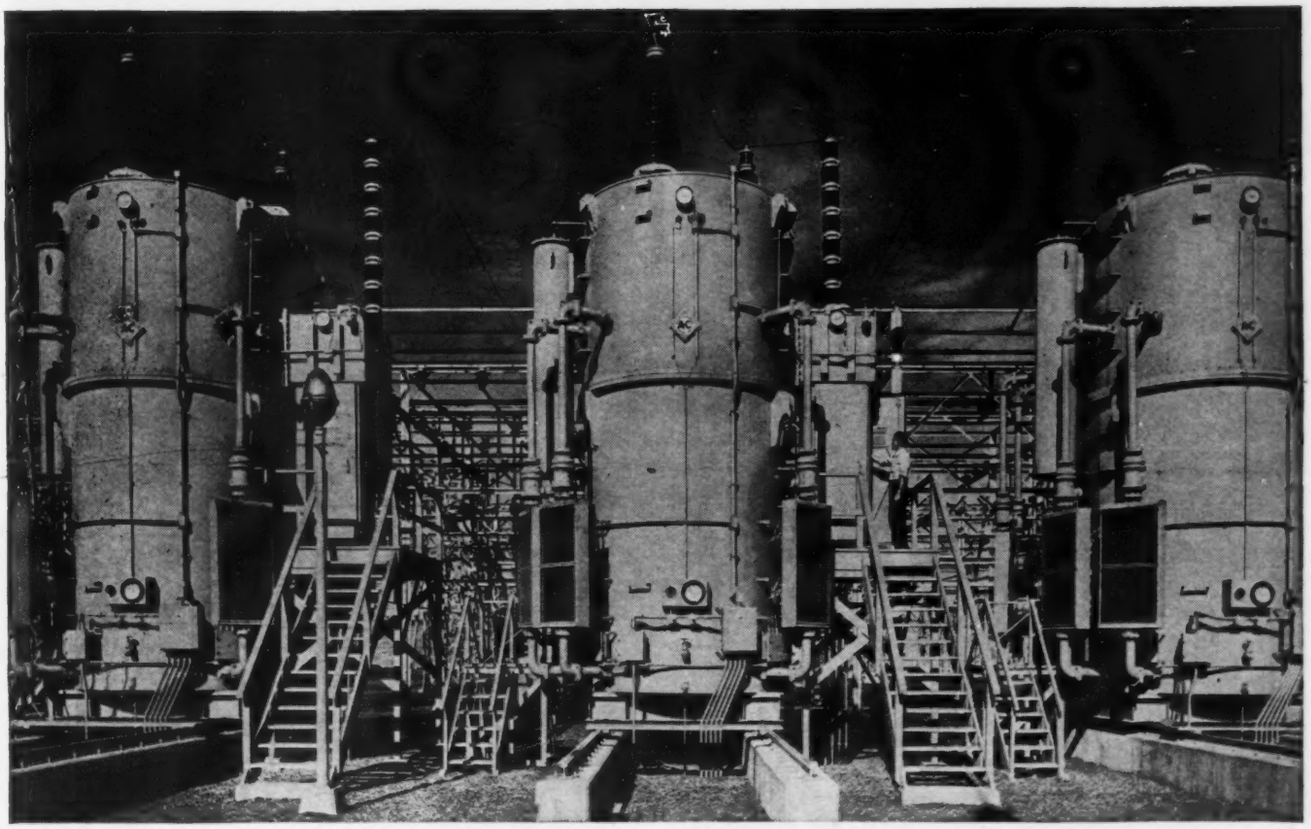


STURDY dial switch assembly typifies care which goes into building A-C load ratio control.

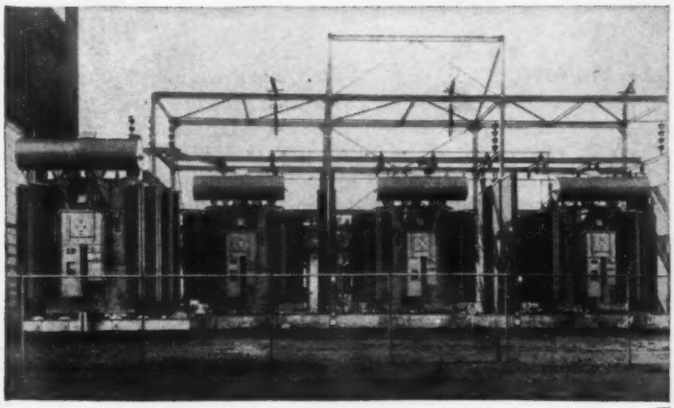


MAKING dependable load ratio control for power transformers demands the careful workmanship which skilled Allis-Chalmers machinists are able to supply.

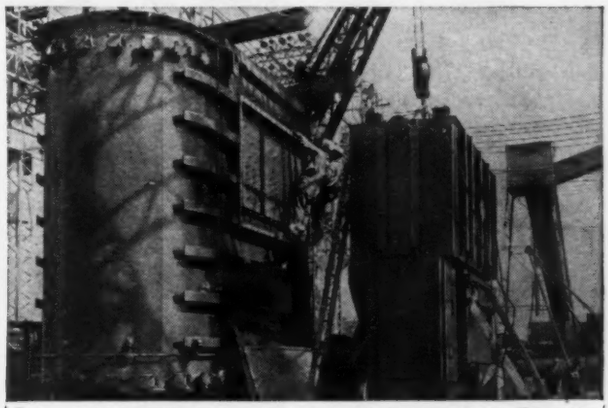
PARTS which go into the Allis-Chalmers load ratio control assembly are accurately aligned, to insure permanent precision operation.



AN EXAMPLE of using load ratio control to make possible a system tie is this 150,000 kva bank of Allis-Chalmers transformers. Today's system interconnections often require that power transformers be equipped with load ratio control.

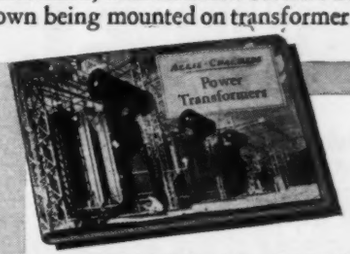


ALLIS-CHALMERS load ratio control is employed on two of the three windings used in these complex power transformers, which have given many years of dependable service to an Eastern utility.



A MIDWEST UTILITY recently installed this 24,000 kva Allis Chalmers power transformer, with load ratio control. Control compartment is shown being mounted on transformer tank.

INVEST IN
ALLIS-CHALMERS
Power Transformers
WITH LOAD RATIO CONTROL



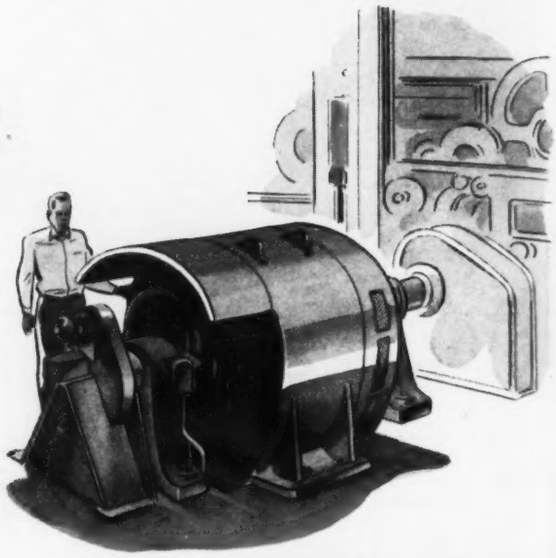
WRITE FOR GRAPHIC NEW ILLUSTRATED BULLETIN

"Allis-Chalmers Power Transformers"

Sixteen installations; also picture-story of transformer manufacture. Ask for Bulletin B6402, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

A 1959

"What! Stop a 30" Calender Roll in Less than 14" of Roll Travel!"

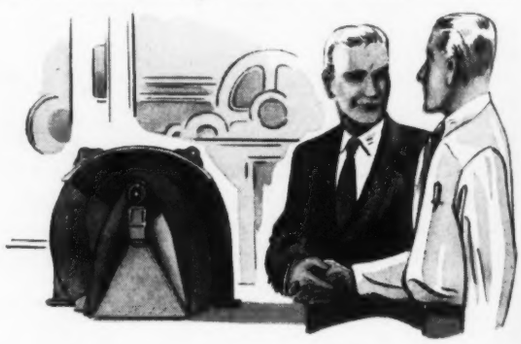


"Right! And besides that emergency stop, give us 10 to 1 speed range on the motor and hold speed *close*. The torque characteristic of our calender requires that the motor have high overload capacity at low speeds without overheating. And because of operating conditions, we want sparkless commutation too!"

B-b-u-t-t... "No buts" said Mr. Rubber Mill Man, "that's *exactly* what we need. You see, we're experimenting with new materials on our rolls, and since we can't *pre*-determine best roll speeds for them, we must have a drive that'll give us complete *range* of speeds, and at the same time, complete *protection* for our workers".

"In A Nutshell, you and the control engineers must design a calender drive system that'll give us *higher* and *lower* calender speeds, *closer* speed regulation and *sudden* emergency stopping — *all three!*" Well, we set up meetings between the control and motor designers to plan a *coordinated* design that would meet the needs.

An Automatic Speed Control incorporating both our m-g set and "Regulex" exciter was designed to hold selected speed within close limits. And, after a careful analysis of required load characteristics, we designed a 400 hp d-c motor of low inertia for quick stopping . . . and which also provided speed range from 25 to 250 rpm.



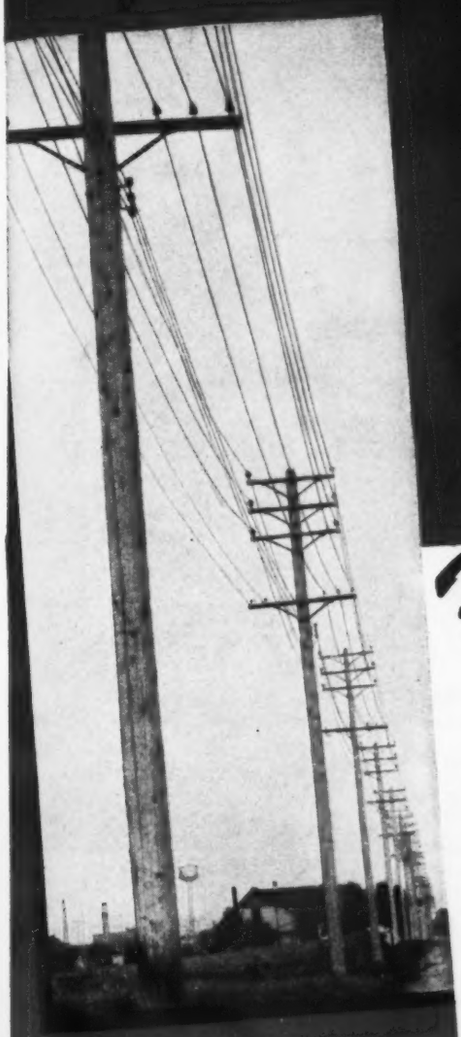
Remember That 14" Stop? After the system went in, we stopped the rolls first at 18" . . . easy. Then at 14" . . . at 12" . . . at 9"! And we probably would have stopped 'em even shorter but for possible danger of too sudden stops to the calender gear system. And commutation? After 6 months, the operators say it's perfect. A 2048

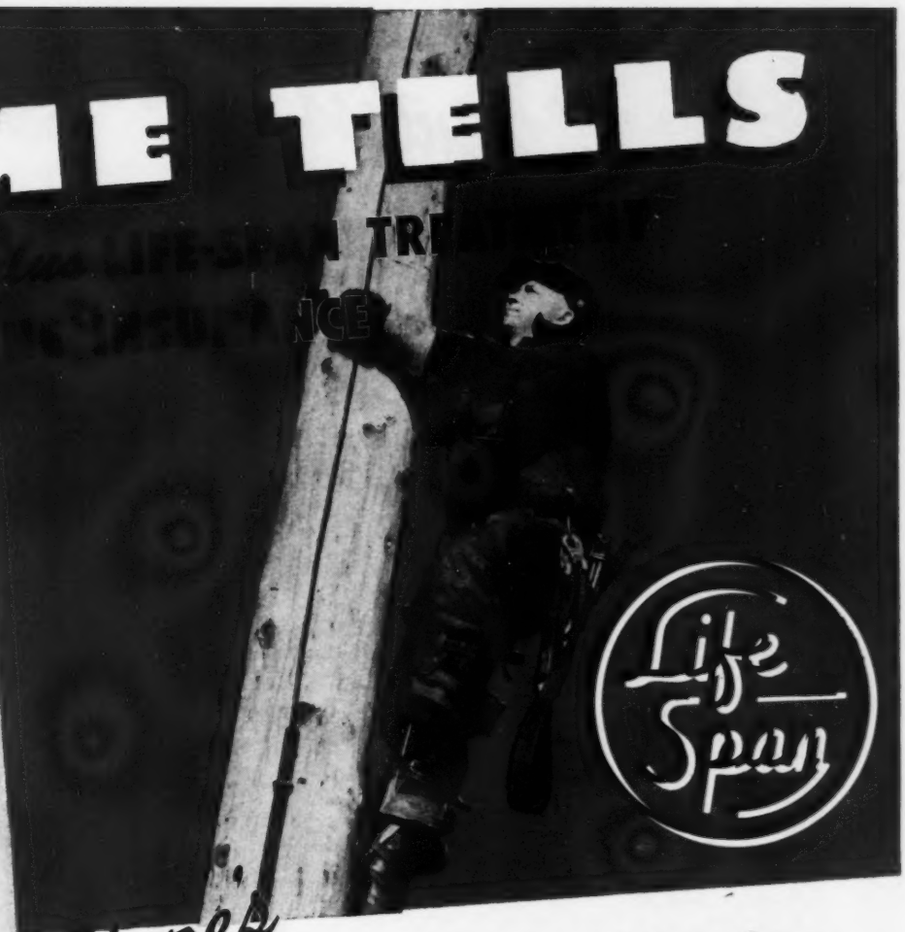
Moral: Every time Allis-Chalmers discovers new ways of solving *special* motor problems, like this one, it also learns how to build better *standard* motors for you! Watch for these new and better motors from A-C. ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.

Wait 'til you see the NEW

ALLIS-CHALMERS MOTORS!

TIME TELLS





Here! **the Perfect Combination for Soundness That LASTS**

Your whole line investment is largely dependent on the quality and durability of the supporting structure—the poles. Cedar with its native strength plus "LIFE-SPAN" treatment will provide maximum life for your entire transmission and distribution pole investment—because "LIFE-SPAN" treatment assures complete protection to the full depth of the sapwood—for the full length of the pole. Choose Cedar plus "LIFE-SPAN" full length treatment for outstanding pole line performance.

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LIFE-SPAN CEDAR *Full Length Treated* POLES

PAGE *Stainless Steel* STRAND

for Ground Wire, Guy or Messenger Wire

Are you having troubles with corrosion—vibration—lightning?

Here is a six-page, file-size folder of information about this new Page product – what it is, how it will serve you better and longer, why it will enable you to save on installation as well as maintenance costs. For your copy of this folder, write to the Page factory in Monessen, Pa. Ask for DH-521.

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PAGE STEEL AND WIRE DIVISION
AMERICAN CHAIN & CABLE

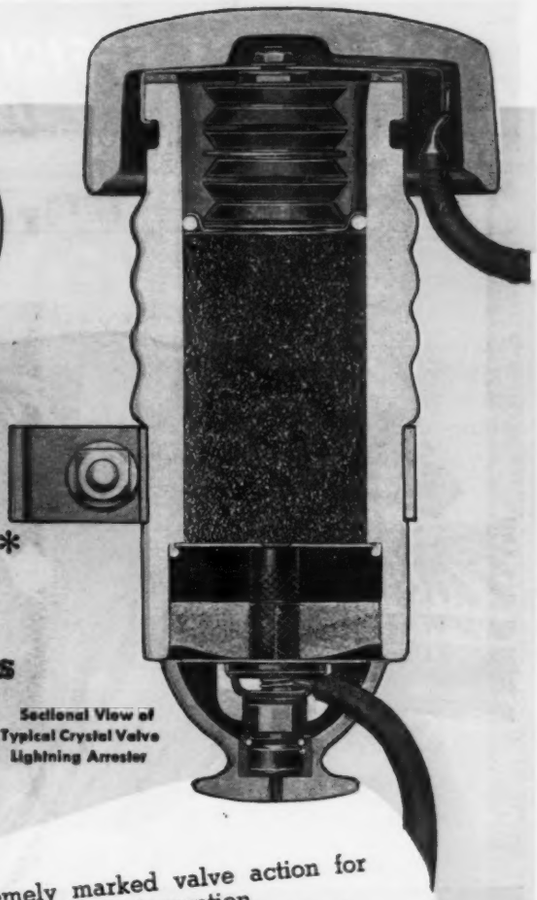
TRADE MARK

OXIDIZED
Silicon Carbide

TODAY'S MOST HIGHLY DEVELOPED VALVE ELEMENT*

Used only and exclusively in Crystal Valve Lightning Arresters

*U. S. Patent Nos. 2150166 and 2150167



Sectional View of Typical Crystal Valve Lightning Arrester

Oxidized Silicon Carbide is initially a specially processed type of electrical silicon carbide. After crushing, washing, sizing, etc., a special high-temperature chemical treatment provides each crystal with *a thin, porous coating* of silicon dioxide—SiO_2.

Oxidized Silicon Carbide was developed to embody specific electrical characteristics adapted to lightning arrester operation. Such characteristics as its resistance and valve action provide Crystal Valve arresters with—

1. Low IR voltage drop and ample surge voltage reduction, with adequate surge energy absorption.
2. Heavy-duty surge discharge capacity.
3. Extremely marked valve action for follow current interruption.
4. Long life, since no measurable deterioration of Crystal Valve arresters occurs after years of normal service.

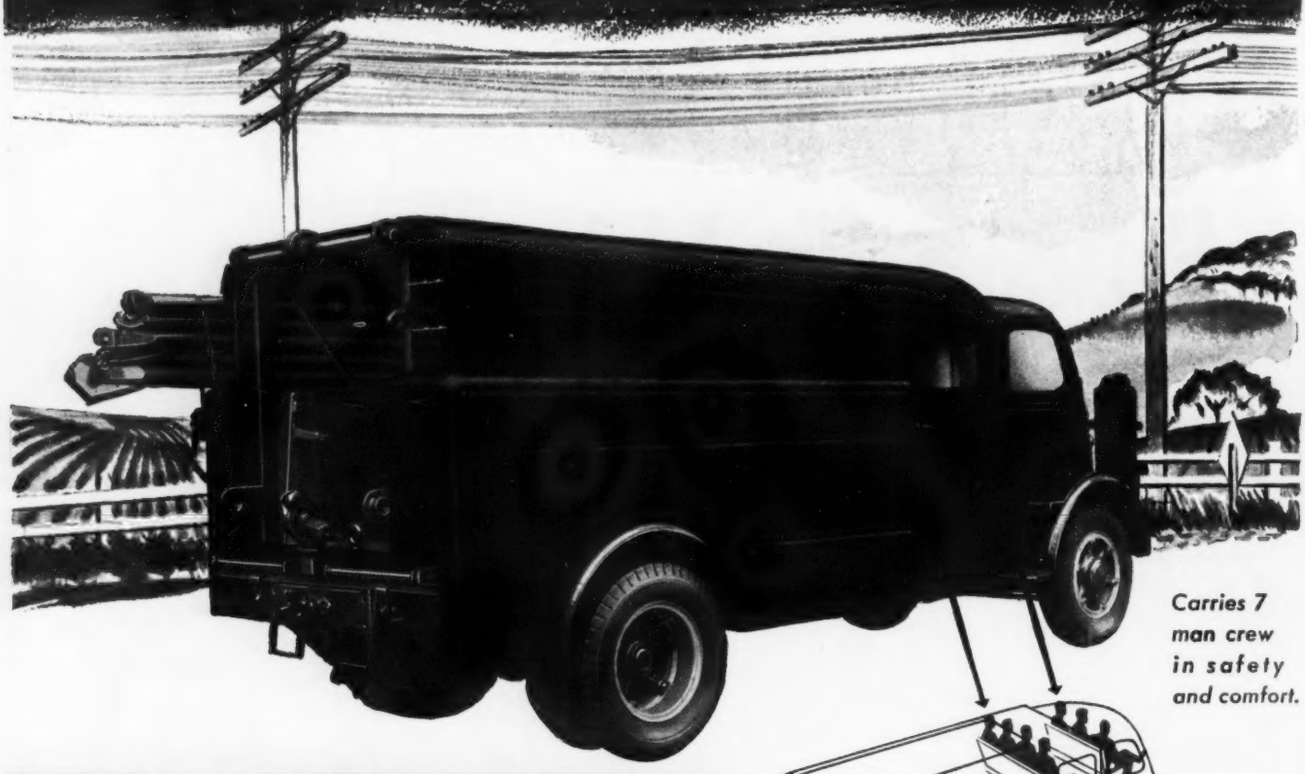
No material so far developed for the valve element of lightning arresters has advantages and characteristics as definitely outstanding as does Oxidized Silicon Carbide grain; it is because of these outstanding features that Crystal Valves have attained such an enviable reputation in protecting equipment and service.

Where arrester performance must be critical and exacting; where it must be depended upon absolutely—the Crystal Valve is definitely indicated.

ELECTRIC SERVICE MANUFACTURING CO. • 17th & CAMBRIA STS., PHILADELPHIA 32, PA.

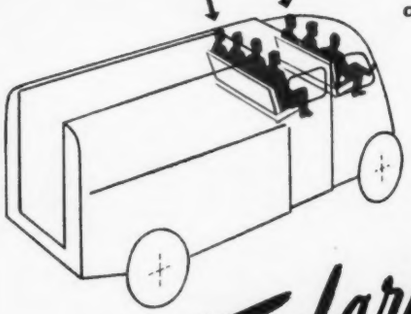
CRYSTAL VALVE
LIGHTNING ARRESTERS

MAXIMUM EFFICIENCY — ECONOMY — STYLE...



Carries 7 man crew in safety and comfort.

POWERS
UTILITY BODIES



in Standard designs

From crew compartment to skid rail, POWERS Line Construction and Maintenance Bodies are engineered for economy and efficient service. Incorporated in the standard specifications are suggestions from operators all over America.. your assurance of well-balanced equipment, properly arranged to carry tools and supplies. Custom features for your particular needs may also be included at little... perhaps no extra cost. Complete information upon request.

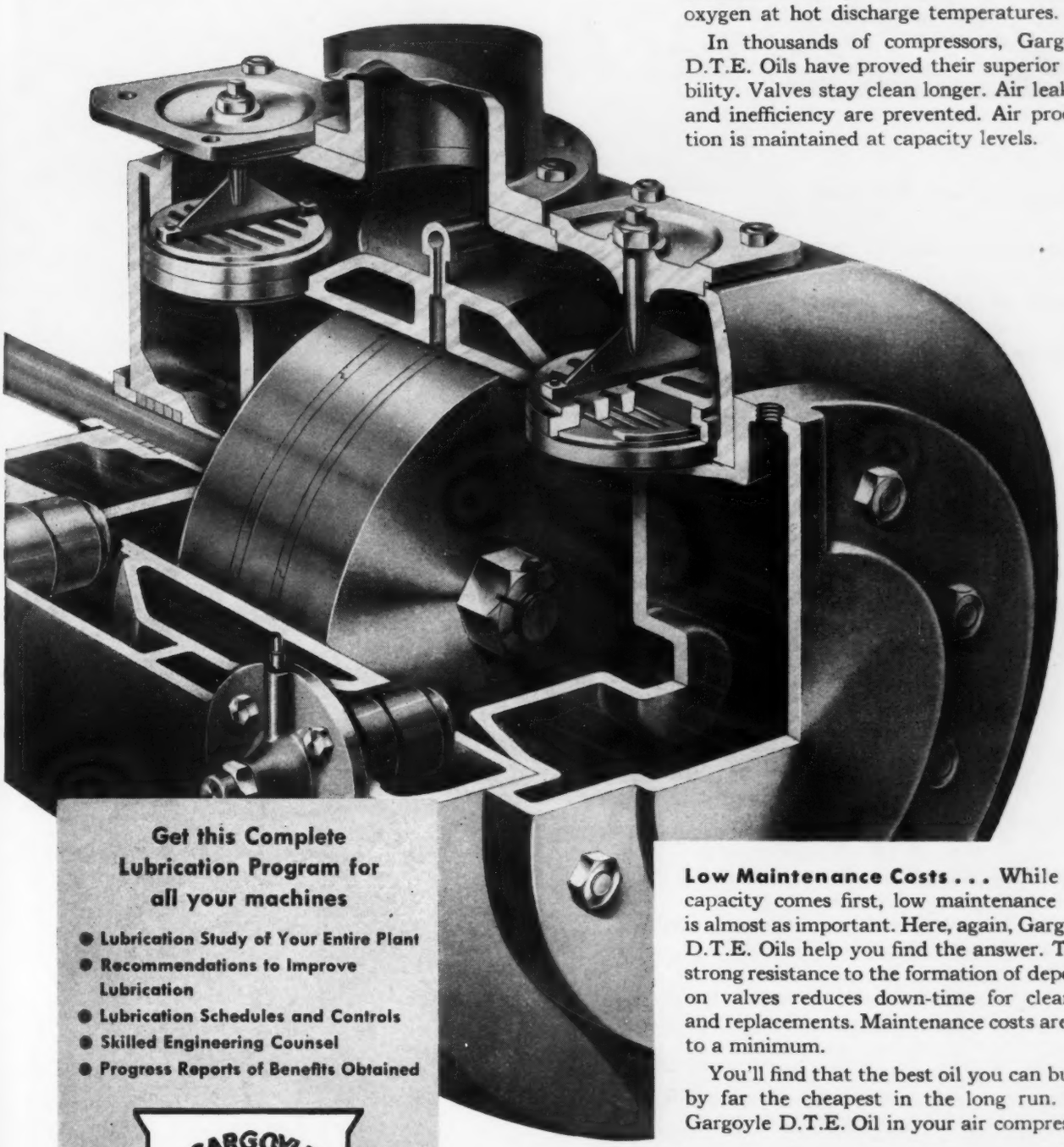
McCABE POWERS AUTO BODY COMPANY — ALL-STEEL POWERS Public Utility Bodies — 5900 NORTH BROADWAY, ST. LOUIS 15, MO.

LINE BODIES • POLE TRAILERS • BRUSH TRAILERS • GENERAL SERVICE BODIES

What do you expect from your Compressor?

Continuous Full Power . . . For maximum efficiency, your air compressor valves must stay free from clogging oxidation deposits. This calls for a compressor oil with high chemical stability to resist the attacks of oxygen at hot discharge temperatures.

In thousands of compressors, Gargoyle D.T.E. Oils have proved their superior stability. Valves stay clean longer. Air leakage and inefficiency are prevented. Air production is maintained at capacity levels.



Low Maintenance Costs . . . While full capacity comes first, low maintenance cost is almost as important. Here, again, Gargoyle D.T.E. Oils help you find the answer. Their strong resistance to the formation of deposits on valves reduces down-time for cleaning and replacements. Maintenance costs are cut to a minimum.

You'll find that the best oil you can buy is by far the cheapest in the long run. Get Gargoyle D.T.E. Oil in your air compressor.

Get this Complete Lubrication Program for all your machines

- Lubrication Study of Your Entire Plant
- Recommendations to Improve Lubrication
- Lubrication Schedules and Controls
- Skilled Engineering Counsel
- Progress Reports of Benefits Obtained

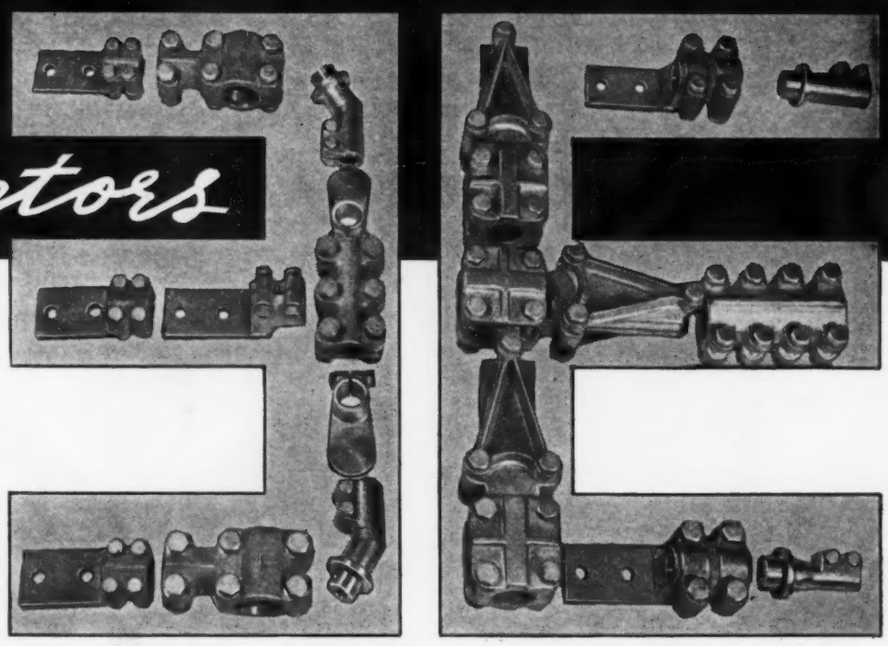
GARGOYLE
Lubricants

Socony-Vacuum Oil Company, Inc.

and Affiliates: Magnolia Petroleum Co., General Petroleum Corp. of Calif.

Tune in "Information Please"—Monday Evenings, 9:30 E.D.T.—NBC

A POWER CIRCUIT IS ONLY AS GOOD AS ITS *Connectors*



To make sure that your connectors are at par with other vital circuit equipment, Specify . . . THREE E.

"3E" POWER CONNECTORS

HAVE THE FOLLOWING FEATURES . . .

★ *Made of high conductivity copper or copper alloy*

★ *Properly proportioned for all electrical and mechanical requirements*

★ *Carefully machined for good and lasting contacts*

★ *Designed for easy installation.*

OUR BULLETIN No. 401 lists a large variety of connectors for bar, tubing, cable, and wire. They are made in clamp style solder or shrink fit. Expansion connectors and grounds fittings are also listed. Every Distribution Engineer should have a copy. Write for yours.

Keep the Power Flowing

WITH

"3E" POWER CONNECTORS

THREE — ELECTRICAL ENGINEERS EQUIPMENT CO. — MELROSE PARK, ILLINOIS

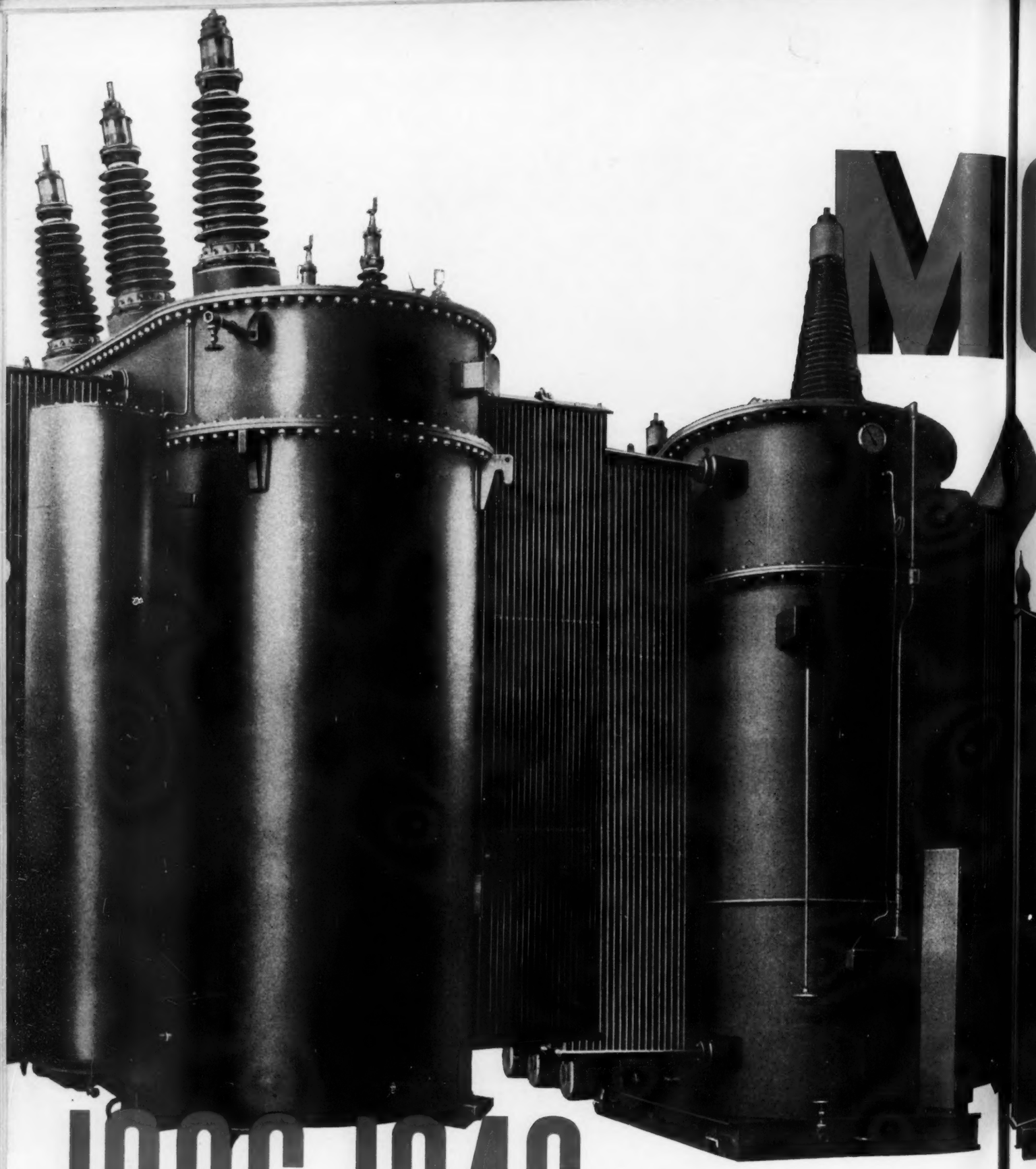
-producing watthour meters

THERE is no magic "open sesame" command that will make electric metering equipment come forth from the ether to meet the big demand that exists today. Nevertheless, Duncan has, thru the hard work of its trained personnel from one end of the plant to the other, brought postwar production up to the maximum rate permissible with the materials available to date. Every piece of metering equipment that can be produced is going out to customers as fast as it can be tested and proved up to Duncan's standards for quality . . . accuracy . . . performance. Long a contributor to the advancement of the metering art, Duncan continues with every effort to do its job of supplying watthour meters.

DUNCAN ELECTRIC MFG. CO. Lafayette, Indiana

. . . makers of watthour meters for over forty years

DUNCAN
WATTHOUR METERS



1896-1946... *leadership i*

POWER AND DISTRIBUTION TR

OLONEY

TRANSFORMERS

•

50 Years of Leadership

Leadership and experience that are your assurance of *plus performance.* For not only has Moloney, throughout the years, concentrated solely on the manufacture of Transformers, but during these 50 years, Moloney has accumulated a wealth of data which through skillful application has brought about continuous improvement in design and performance. Your transformer, built by Moloney has the benefit of concentrated experience and wide research . . . unexcelled in the electrical industry.

•

MOLONEY ELECTRIC CO.
ST. LOUIS 20, MO.
Sales Offices in all Principal Cities

in RESEARCH • DESIGN • ENGINEERING

TRANSFORMERS EXCLUSIVELY SINCE 1896

To the many plants faced with meeting severe conditions of local dust ordinances and yet lacking suitable space for a conventional dust collector installation, the following examples of Thermix Tubular installations will provide food for thought:

● In a 125,000 lbs. per hour unit, a Thermix Tubular was installed at the bottom of the tubular air preheater . . . *in the same floor area* . . . using the preheater hoppers for the dust collector.

● A Thermix Tubular Dust Collector was installed *in the bell* of an 8′ diameter stack, handling a 300,000 lb. per hour pulverized fuel boiler.

● In a large paper mill using five pulverized fuel boilers, designs of which did not include provisions for a dust collector, Thermix Tubular Collectors were successfully installed.

These and many others are testimony to the minimum space requirements of Thermix Tubular Dust Collectors, available in extremely compact, easily installed six and nine inch diameter tubes . . . their high efficiency is an established fact.

Write for our suggestions for solving your dust collection problems.

●

THERMIX ENGINEERING COMPANY

Project and Sales Engineers

First National Bank Bldg. Greenwich, Conn.

PRAT-DANIEL CORPORATION

EAST PORT CHESTER, CONN.

WHITE-painted ceilings and walls help lighting fixtures to provide better seeing conditions.

American industry recognizes the importance of GOOD LIGHT to good seeing and general plant efficiency. A recent survey shows that 63.1% of all plants plan on improved lighting as part of their "general modernization" programs.

But in your planning of lighting systems don't forget PAINT—for top light and seeing authorities agree that *paint is part of the lighting system.* On plant ceilings and walls, for example, WHITE paint increases lighting efficiency because of its maximum (80-90%) diffuse reflection factor.

Furthermore, it helps *distribute* light evenly throughout the working area and thus reduce the harsh shadows and brightness contrasts which inhibit easy, accurate seeing. For down-to-earth data on this partnership of Light and Paint, send today for a free copy of "COLOR FOR INDUSTRY."

BARRELED SUNLIGHT

U. S. GUTTA PERCHA PAINT COMPANY
142 Dudley Street, Providence 1, Rhode Island

I'd like to know more about the partnership of Light and White Paint. Please send me a free copy of "COLOR FOR INDUSTRY."

COMPANY.....

STREET AND NUMBER.....

CITY..... ZONE..... STATE.....

MY NAME IS.....

MY TITLE.....

© 1946 U. S. Gutta Percha Paint Company

GET THESE 2 ROLLER-SMITH FEATURES
IN YOUR SWITCHBOARD INSTRUMENTS

★ Large Easy-to-Read Scale
★ Accuracy to within 1%

★The large 5¼ inch scale printed in jet black on a bone white background makes all Roller-Smith switchboard instruments easy-to-read.

The accurate calibration and careful construction and design hold the instrument to an accuracy of 1%. Each instrument is individually calibrated and the scale then accurately drawn.

There is a mounting and style to meet individual preferences and needs. Round cases for surface mounting. Rectangular cases for surface or flush mounting. A full range of sizes and capacities is available in each type case and mounting. For full information, write for Catalog 4220.

FOR EVERY SWITCHBOARD NEED

Round—Surface Mounted
Rectangular—Surface or Flush Mounted
Direct Current
Ammeters **Voltmeters**
Alternating Current
Ammeters **Power Factor Meters**
Voltmeters **Frequency Meters**
Wattmeters **Synchroscopes**

ROLLER SMITH

ROLLER SMITH
Switchboard Instruments

BETHLEHEM • PENNSYLVANIA

In Canada: Roller-Smith Marsland, Ltd., Kitchener, Ontario

STANDARD AND PRECISION ELECTRICAL INSTRUMENTS • AIRCRAFT INSTRUMENTS • SWITCHGEAR
AIR AND OIL CIRCUIT BREAKERS • ROTARY SWITCHES • RELAYS • PRECISION BALANCES

STATIC-PROOF HARDWARE

Practical help in solving two important public utility problems is provided by Oliver Static-Proof Hardware.

Extensive investigations show that looseness between component parts of pole line hardware causes radio interference. This sometimes becomes a serious public-relations problem. Oliver Static-Proof Hardware has been designed to eliminate this trouble.

In addition, the use of this material reduces maintenance, because less attention and retightening is required. All along your lines, Oliver Static-Proof Hardware is a good investment.

Ask your Oliver representative about this important group of Oliver Pole Line Materials.

Full details are given in Oliver Catalog 43.

OLIVER
IRON AND STEEL
CORPORATION

SOUTH TENTH AND MURIEL STS. · PITTSBURGH 3, PA.

Home Town Enterprise

on a Nation-wide scale

OTIS MAINTENANCE FOR OTIS ELEVATORS

The men and women in your local Otis office — friends and neighbors of your townspeople — are working to maintain service on Otis elevators in your locality — at standards based on nation-wide experience.

Your office and the 244 other Otis offices report regularly to headquarters on every elevator under Otis Maintenance Service, and standards for your locality are based on analyses of these nation-wide reports. If yours is a small freight elevator, it must compare favorably with 5,700 others in its class. If you have a high-speed gearless passenger installation, it is graded against more than 3,000 others in the same group.

Otis Maintenance is a service by Otis for Otis elevator owners . . . available at a flat monthly rate through your local Otis office.

Otis ELEVATOR COMPANY
OFFICES IN ALL PRINCIPAL CITIES

WHEN AND WHERE NEEDED . . .

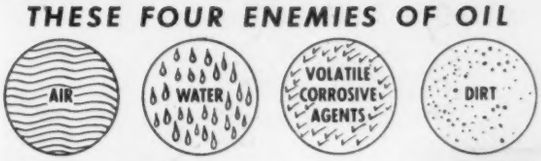
THE *Portable* HYDRO-VOLIFIER brings new economy, assures effective *"Preventive Maintenance"* to insulating Oils

the Buckeye Process

One man, with a truck-mounted Hydro-Volifier, can *maintain* effectively all of the transformer and circuit-breaker oil throughout a widespread system of Substations. Simply and economically . . . without the use of chemicals or earth . . . and without the use of complicated equipment, the Buckeye Process improves oil dielectric more than 200%* in a single pass. With the Hydro-Volifier, there is no necessity to interrupt the service of oil-filled equipment. No air can come in contact with the oil during the entire treatment.

*See Case History No. 2 on Page 5 of Bulletin 100-C

THESE FOUR ENEMIES OF OIL



REMOVED BY TWO SIMPLE STEPS

1. "Atomizing" the oil into minute particles to make easy the separation of water, gases and volatile acids.

2. Performing Step 1 in a vacuum, not only to separate the deteriorating elements from the oil, but also to prevent the re-entry of these "enemies" into the oil.

There are no moving parts... nothing to get out of order or to clean

Get the Facts

Get your copy of Bulletin 100-C

BUCKEYE
LABORATORIES CORP.
1965 East 66th Street
Cleveland 3, Ohio

Buckeye Laboratories Corporation
1965 East 66th Street Cleveland 3, Ohio

Gentlemen: Please send me a copy of your new Bulletin 100-C.

Name.....

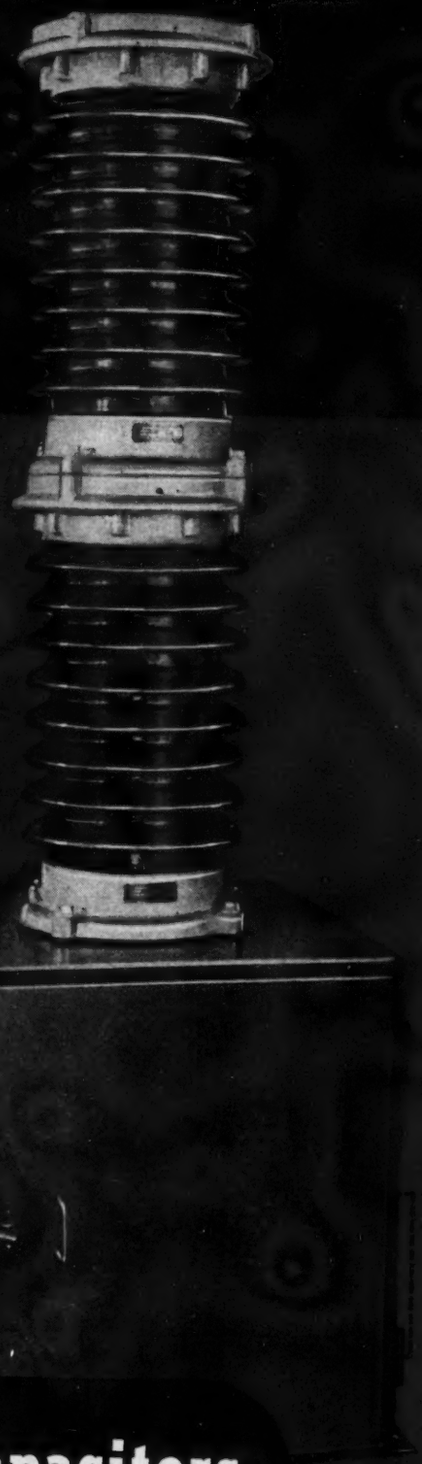
Company.....

Street.....

City.....State.....

BETTER DESIGN AND PERFORMANCE

FOR CARRIER-CURRENT COUPLING



OUTSTANDING in quality and performance is the enlarged Type CA unit for carrier-current coupling. Typical of Cornell-Dubilier's improvements in capacitor design are Type CA's fog-type petticoats which provide a large creepage path between terminals to give high resistance at high frequencies. Galvanized malleable iron mounting flanges permit stacking for high voltage connection. The base is large enough to accommodate the mounting of auxiliary equipment. Both base and top are specially sealed for leakproof service. New inner construction gives great tensile strength.

Investigate the advantages of this Type CA carrier current coupling capacitor. Your local C-D Field Engineer will be glad to answer your questions, or you may write to us. Cornell-Dubilier Electric Corporation, South Plainfield, New Jersey.

An installation of C-D Type CA Capacitors for coupling carrier communication and signalling on a 110,000 volt, 3 phase, grounded neutral line. This capacitor is rated at 76,000 volts.

Cornell-Dubilier *World's Largest Manufacturer of* **Capacitors**

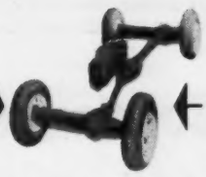
CORNELL-DUBILIER CAPACITORS

DEPENDABLE FWDs

. . . able to go wherever utility work has to be done!

FOUR-WHEEL-DRIVE

A "plus" that pays.. in many ways !



Rugged, dependable FWD utility trucks will get the men and equipment through to do the job wherever it has to be done, regardless of weather, road conditions, or even lack of roads! Wherever live-trouble "pops". . . wherever there's a tough job of maintenance or construction work, pole-pulling or pole-setting . . . anywhere, far off the highway over rugged terrain or in deep muck . . . you can rely on FWDs.

These are utility-engineered trucks . . . they give you all the advantages of the true FWD four-wheel-drive principle with center differential . . . power drive and traction on all wheels . . . balanced weight and power distribution . . . working-strain shared by two driving axles instead of one . . . and dependability in performance that makes FWDs the first choice of hundreds of utilities, many of whom operate big FWD fleets. See your FWD dealer or write for information on FWDs now ready to go to work for you.

THE FOUR WHEEL DRIVE AUTO CO.
CLINTONVILLE, WISCONSIN
Canadian Factory: KITCHENER, ONTARIO

FWD TRUCKS

THE ORIGINAL EXCLUSIVE BUILDERS OF FOUR-WHEEL-DRIVE TRUCKS

"More Power on More Wheels"

(ADVERTISEMENT)

COPPER ALLOY BULLETIN

MARINE AND POWER EDITION

REPORTING NEWS AND TECHNICAL DEVELOPMENTS OF COPPER AND COPPER-BASE ALLOYS

Prepared by Bridgeport Brass Company "Bridgeport" BRASS CO. *Headquarters for BRASS, BRONZE, and COPPER*

Extending Condenser Tube Life

Effect of Alloy Composition and Water Composition

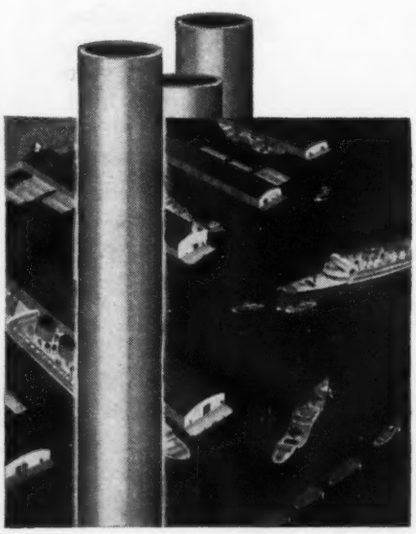
In order to obtain maximum condenser tube life and most satisfactory performance, power plant operators are vitally interested in the cause of premature tube failure as well as factors which lengthen tube life. Numerous laboratory examinations of condenser tubes have revealed a number of different factors which influence the corrosion rate of condenser or heat exchanger tubing in power plants. Among them are alloy composition; composition of water; composition of steam and condensate; nature and distribution of corrosion products; character and quantity of silt and debris; velocities of water and steam; stress; design and operation of condenser; temperatures and pressure; and galvanic coupling. The two factors which stand at the head of the list are water composition and alloy composition.

Effect of Water Composition

The corrosiveness of water depends upon the concentration of dissolved solids and gases; pH value and many other factors. The total mineral content of water varies from less than 0.003 per cent for some natural fresh water up to 3.5 per cent for sea water. The total salt content has a direct bearing on the corrosiveness of the water.

The importance of pH value (hydrogen ion concentration) has been studied in considerable detail and found to vary depending upon the metal being corroded and upon the concentration of all other substances present. A decrease in the pH value usually indicates a rise in corrosion rate. Clean sea water normally has a pH value of more than 8.0, whereas harbors, estuaries and bays may have lower pH values because of contamination from sewage and factory wastes. The higher corrosion rate of harbor water indicates the need for more corrosion-resisting alloys than are required for water in the open ocean. The corrosiveness of natural fresh water with a pH of 7.0 to 8.0 is usually much less than that of sea water with a similar pH. This difference is due primarily to the greater concentration of mineral matter in sea water and is one reason why the average life of condenser tubes in power plants using fresh water is much longer than that of the same alloy in seaboard power plants. The corrosiveness of fresh water with the same values may also vary considerably due to differences in the concentration and nature of the minerals, gases and other substances present in the water. In other words, the pH values should be used in conjunction with the entire chemical analysis of the water. Power plant operators should check pH values periodically and investigate any changes promptly. The subject of water analysis is gaining increasing importance in the operation of power plants.

A high concentration of such gases as hydrogen sulphide and carbon dioxide usually increases the corrosion rate. Organic material and suspended matter varies considerably in effect, and sometimes the decomposition products of these substances cause difficulty. If the suspended matter is ferrous in nature it may protect the material upon which it deposits. Sand and silt may have a scouring action which may be beneficial in cleaning condenser and heat exchanger tubes, but on the other hand this may, over a period of time, reduce the wall thickness of the tubes. However, cinders, sand, mud, wood, stones and other small particles are very likely to lodge in various parts of the condenser tubing and cause deposit attack.



Effect of Alloy Composition

Corrosion studies and metallurgical research have accomplished a great deal in developing alloys which will stand up under higher water velocities, corrosive waters and more severe operating conditions. There is much information available which shows that the addition to copper of such alloying elements as tin, aluminum, nickel, zinc, iron and arsenic, used singly or in combination, very markedly influences condenser tube life.

For example, long experience has shown that the addition of arsenic to condenser tube alloys has resulted in greatly increased service life. The addition of arsenic to Muntz metal inhibits dezincification and reduces general corrosion rate appreciably. In the case of Admiralty, arsenic also lowers the general corrosion rate as well as inhibiting dezincification. Arsenic also improves the corrosion resistance of both Cuzinal (aluminum brass) and Duronze IV* (aluminum bronze). The addition of 0.30 per cent to 0.50 per cent iron and 0.50 to 1.00 per cent manganese to Cupro Nickel has been found distinctly beneficial for retarding impingement, pitting, and general corrosion from sea water. All Bridgeport Cupro Nickel condenser tubing contains iron and manganese. This alloy is used where water velocities and turbulence might cause premature failure of ordinary condenser tubing.

Duronze IV (aluminum bronze) is one of the finest condenser tube alloys available because it has demonstrated its superiority for meeting complex corrosion problems encountered in power plant practice such as tidal estuaries where salt water is mixed with polluted fresh water which may contain sewage, industrial wastes and cinders. This alloy also stands up well in power plants using high velocity water containing entrained gas bubbles which impinge on the condenser tube walls.

Many Corrosion-Resistant Alloys Available

Bridgeport offers a number of corrosion-resistant condenser tube alloys which will give maximum service life when used under conditions for which they are best suited. It will pay power plant operators to contact Bridgeport's Technical Service Department and arrange to try out test lots of these alloys in order to determine which is best. Write for Bridgeport's 112-page Condenser Tube Manual which contains much practical information together with specifications, results of corrosion research and other valuable facts.

**U. S. Pat. No. 2093380*

BRIDGEPORT BRASS

BRIDGEPORT BRASS COMPANY, BRIDGEPORT 2, CONN. • *ESTABLISHED 1865*

TRUMBULL

ISOLATION OF CONTROL

.. for Safety - Economy

Motors and/or other current consuming apparatus . . . with lock-type push button stations . . . of appropriate design . . . for areas in which such equipment is located . . . with Control Center at an isolated location . . . may be one answer to your electrical problem.

Many industrial atmospheres are enemies of electrical control apparatus. The presence of dirt, dust, vapors, moisture, etc., may make it advisable to consider the location of only a minimum amount of control equipment in your actual working areas. Motors . . . YES; Push buttons for start and stop of such motors . . . YES; but actual Control, Disconnect, Short Circuit and Over-Current Protection . . . NO. These functions can be located AWAY from actual working areas, where apparatus can be installed without sacrifice of productive square feet . . . and where maintenance and inspection are facilitated.

In other words, Trumbull will take your safety switches, circuit breakers, controllers and main bus bar structures . . . wrap them up in Steel . . . and build you a Control Center to be located *away* from *trouble.*

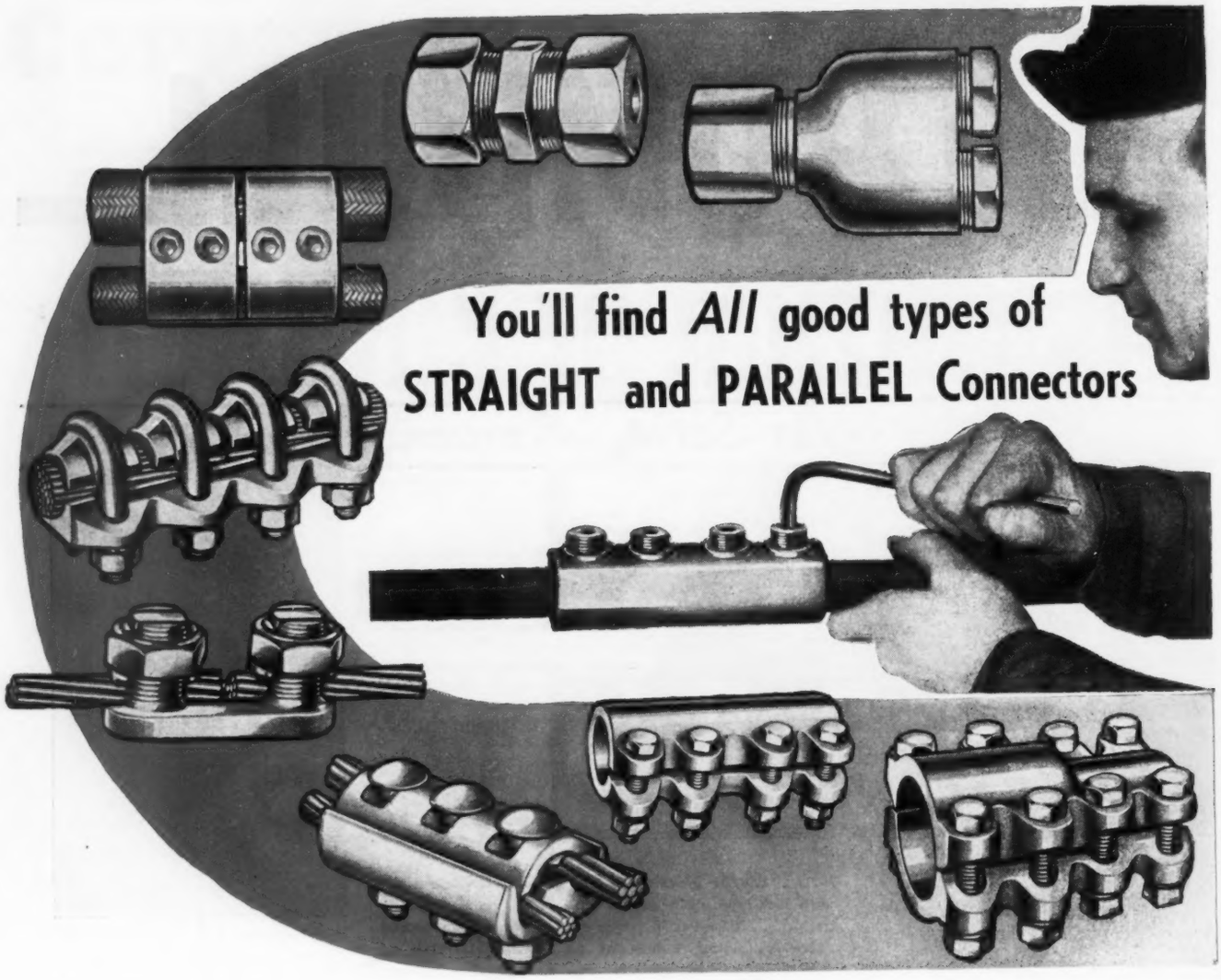
Diagram above shows Production Area containing only motors and push button stations. Removed from troublesome atmospheres, the Control Center is Guardian of the whole situation.

THE TRUMBULL ELECTRIC MANUFACTURING CO.

PLAINVILLE, CONNECTICUT

OTHER FACTORIES AT

NORWOOD, OHIO — LOS ANGELES — SAN FRANCISCO — SEATTLE

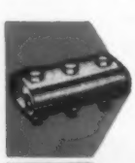


—in the *Complete* line

Yes, it's mighty handy to open your Penn-Union Catalog and pick the exact type you need. They're all there—in a complete range of sizes: Bolted straight connectors . . . screw type . . . various split sleeve types . . . shrink fit . . . universal clamps . . . E-Z connectors with yoke and nut, etc.

The Penn-Union Catalog also gives you the *complete* line of Service Connectors, Tees, Cable Taps, Grounding Connectors, Lugs, Power Connectors, etc.

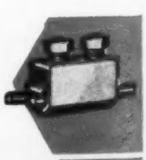
Preferred by leading users—who have found that *"Penn-Union" on a fitting is their best guarantee of unfailing service.*

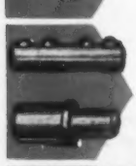


Sold by Leading Jobbers

PENN-UNION ELECTRIC CORP.

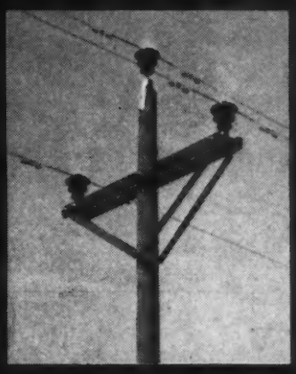
Erie, Pa.

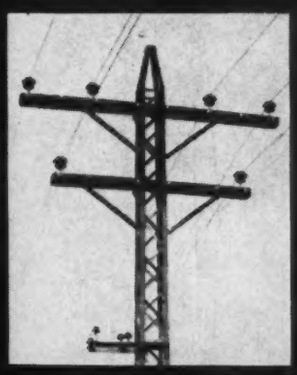




THE *Complete* LINE OF CONDUCTOR FITTINGS

PENN-UNION





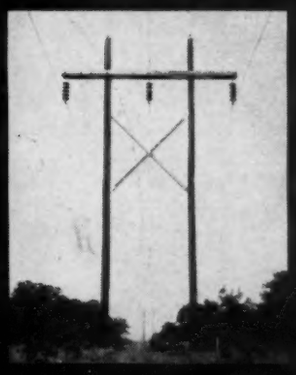
California *Kansas*

If its 3 miles or 300 miles, 6.9 kv. or 230 kv. — Hughes Brothers have a design for it.

Our experience gained by close association with the leading Engineers on most of the country's outstanding wood power line construction is at your service.

Write for Catalog No. 10 or Bulletin No. 15.

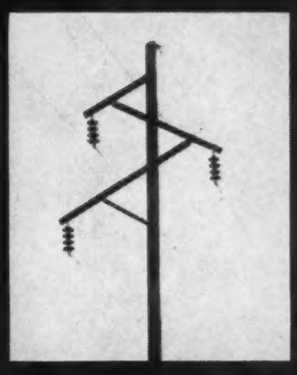
New Hampshire *Texas*

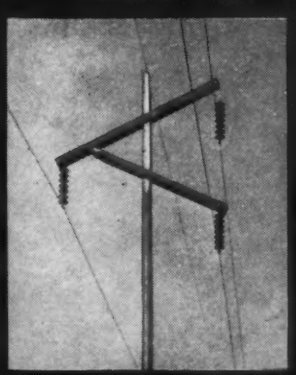


HUGHES BROTHERS

SEWARD NEBRASKA

"HUGHES" TRANSMISSION & DISTRIBUTION WOOD METAL MATERIAL MFRS.





Minnesota *W. Virginia*

MANUFACTURERS OF

Transmission and Distribution Structures

Prefabricated Wood Substations

Wood and Steel Switch Mountings

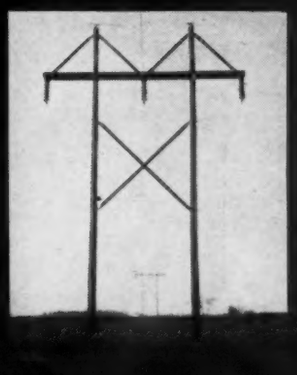
Transmission Line Hardware

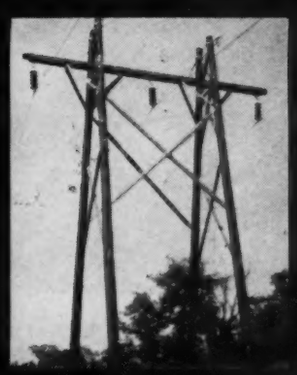
Special Wood Items

Special Steel Items

Wood Bayonets

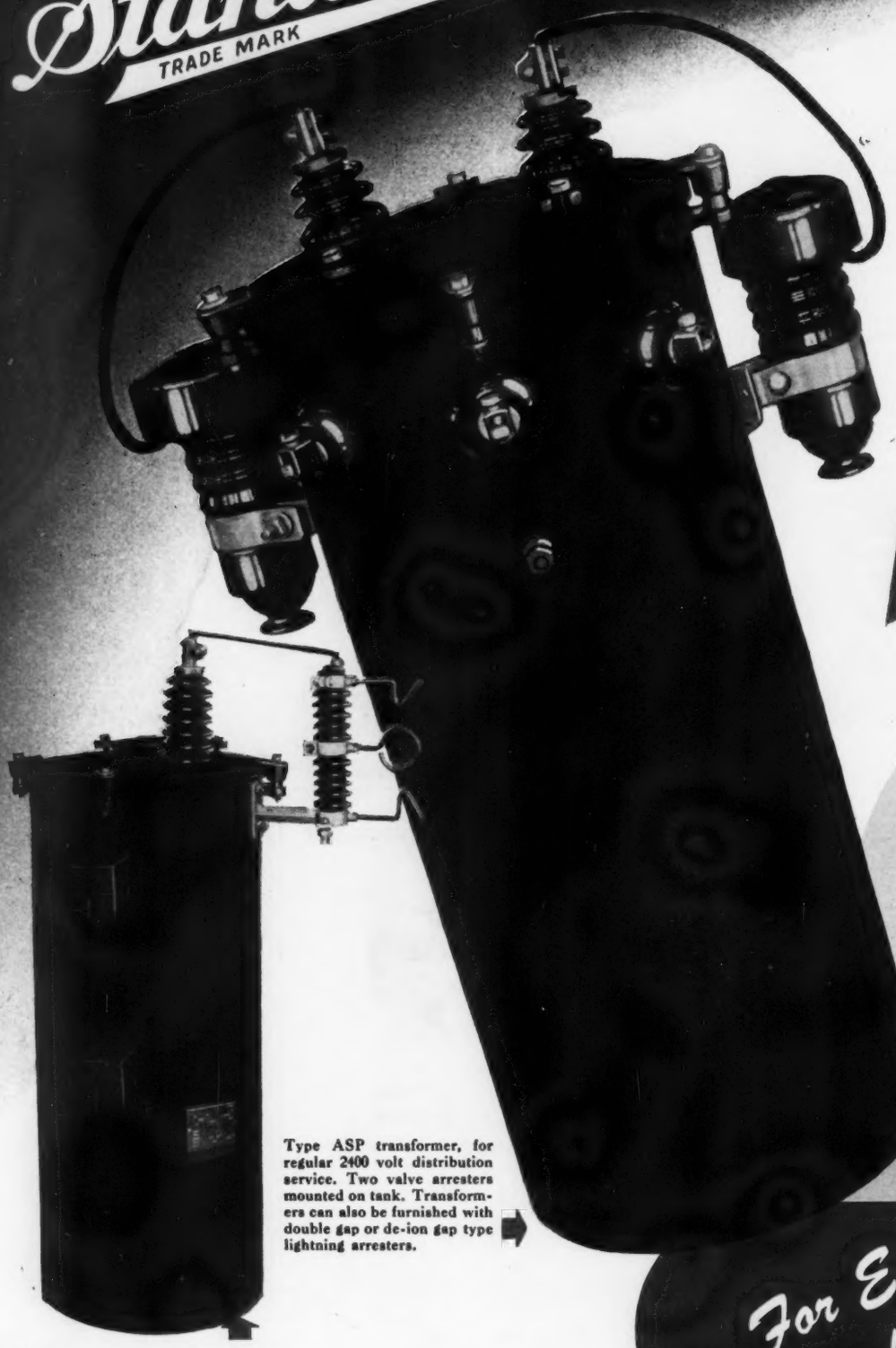
Michigan *Oklahoma*





Standard Distributi

TRADE MARK



25 YEARS OF TRANSFORMER ENGINEERING

Type ASP transformer, for regular 2400 volt distribution service. Two valve arresters mounted on tank. Transformers can also be furnished with double gap or de-ion gap type lightning arresters.

Type ARP transformer, for rural line 7200 volt service, with double gap lightning arrester. Also supplied with valve or de-ion gap types of arresters as specified. Single or double mounting positions available.

For Every class of service

HOUSING CAN COST TOO MUCH

EVERYONE in the United States wants our people, and particularly our war veterans, well housed quickly. Almost everyone, we believe, likes the vigor and imagination with which Wilson W. Wyatt, the housing expediter, is going about the job of mobilizing our housing resources.

No one, however, wants the veterans, or anyone else, to get a lot of severe economic headaches along with the housing. As it stands, the emergency housing program runs unnecessary risks of having such results.

Here are the reasons:

1. The principal opportunity the program offers to the veteran is that of buying a high-cost house where a chance to rent would, more often than not, meet his needs much better.

2. At the worst possible time, the program adds substantially to the dangers of a runaway inflation of the sort that inevitably ends in a crash.

3. Little is done to try to reduce the arbitrarily high costs of building, such as those resulting from restrictions imposed by labor unions and antiquated building codes.

4. By giving overriding priorities to unattainable goals of home construction, the program endangers a volume of industrial construction necessary to sustain full employment.

Needs of Veterans

First on the needs of the veterans. What many, if not most, veterans need is a chance to rent a place at a reasonable rental while they are getting shaken down in their postwar careers which in many cases are inevitably unsettled at this time. Essentially, what the "Veterans Emergency Housing Program" gives them is a chance to buy, for about $6,000, a house built along conventional lines and padded with much unnecessary labor and material cost.

But what are the alternatives? There are at least two. One is to put far more emphasis on more effective use of existing housing than the Wyatt program has thus far. The other is to see that the proportion of new rental units is much stepped up.

Incredible as it may seem, there are at present more than 2,000,000 vacant dwellings in the United States. Many of them should be demolished. But many permit of relatively satisfactory temporary use. Many more single dwellings can readily be converted into comfortable multiple dwellings. The emergency program assumes that only 350,000 dwelling units can be provided this year by these expedients, but it does not seem unreasonable to assume that this figure might be doubled by a vigorous drive. The result would be a better balanced emergency housing program, because it would provide more rental housing immediately and save critical building materials.

Of the new housing units contemplated by the Wyatt program, it is estimated that only about 20 per cent will be for rent. Before the war more than half of the homes in the United States were rented. That means that unless the Wyatt program is to create little less than a revolution in the terms on which homes are occupied, it must be revised to include a much higher proportion of rental units.

To secure the result in the face of present high building costs special inducements will be required. They might be provided by allowing accelerated tax amortization of, say, half the construction cost over the next five years, together with rent ceilings high enough to make this form of investment attractive. This would, of course, call for higher rents, but the actual price to the veteran, in woe as well as money, might well be much less in the long run than if he bought an over-priced house now.

Too Easy To Pay Too Much

One of the mysteries of the Wyatt program is its general emphasis on measures to increase the supply of money with which to buy houses when the demand for houses is already at an all-time high. Some veterans may need special financial help, but the plan to give 90-95 per cent mortgages generally on new homes is not only unnecessary but positively dangerous. By providing up to $3.5 billions of government-guaranteed credit for homes this year, and almost twice as much in 1947, the program will release an equivalent amount of individual savings to create further demand for goods and services. All that such generous mortgage terms will accomplish with certainty is a dangerous lengthening of the odds that we will not avoid a boom and bust cycle of inflation.

If building codes were brought up to date and arbitrary union working restrictions were eliminated, the way would be paved for reductions in the price of standard houses which, it has been estimated, might run as much as 20 per cent. This would both give the buyer of a new house a far better run for his money, and also reduce the inflationary pressure created by the super-generous credit arrangements involved.

Getting anything done along this line is difficult, particularly because the restrictions are imposed by tens of thousands of separate localities and organizations. Some headway is being made. The local emergency housing committees being set up under the Wyatt program provide a means of doing much more. Far more steam must be put behind this aspect of the program, however, if its greatest potentiality for permanently constructive accomplishment is to be realized.

Crippling Essential Industrial Production

The goals set for emergency housing construction —1,200,000 new homes started this year and 1,500,000 started in 1947—are higher than any qualified authority thinks can be met without crippling other essential construction. The reasons commonly assigned for such optimistic goals is that they are inspiring to those in the industry and soothing to those who want something tremendous done about housing.

Under normal circumstances, relatively little damage might be done by such excessive goals which are a common feature of most Washington programs trying to elbow their way to the center of the national stage. However, the emergency housing program carries with it top priorities for the materials to be used. Consequently, other essential construction will have to get along on whatever share of critical building materials will be left after all demands of home builders have been satisfied.

The Civilian Production Administration estimates that output of important materials will fall far short of needs. It forecasts a 15 per cent deficit in lumber, 18 per cent in bricks, and 52 per cent in cast iron radiators. Hence, unless building materials output can be stepped up far more rapidly than now seems possible, a prohibitive squeeze will be put on industrial building to provide the materials needed for the Wyatt program. This would complicate unbearably the problems of sustaining full employment and getting the flow of production so important in avoiding the boom and bust route.

Perspective on the Housing Shortage

What is needed is an aggressive drive to get full production of building materials as rapidly as possible. Such a drive should concentrate on measures aimed at helping the industry remove the obstacles to all-out production rather than on such measures as the subsidy plan which seems quite likely to succeed only in enmeshing the industry in more government controls. After making due allowance for the materials outlook and the needs for essential non-housing construction, housing goals should then be set as high as feasible. As matters stand, by setting construction goals before feasible material goals are determined, the cart is put before the horse.

There can be no doubt about the acuteness of the housing shortage and the necessity of a program commensurate with the magnitude of the problem. It also remains true, however, that the housing shortage for the nation as a whole is not quite as desperate as those who want the country to drop everything and go to building houses would have us believe.

During the war 3½ to 4 million new dwelling units were built or created by remodelling in other than farm areas. The number of families living in such areas increased by less than 3½ million. Even though some of this housing was located in remote places as an adjunct of war production works, the wartime increase permitted a margin for more housing per family at this time. Indeed, it has been estimated that the rate of doubling up is only about one-third as great as in 1940. The margin did not begin to suffice, however, to meet the needs of those millions of people particularly in the lower income groups who, thanks to rapid increases in income, can afford to have and insist upon having better housing than they have ever had before.

A rising standard of income which makes possible a new standard of housing for many people is a fine thing. Above all, it is important to see the veterans get the best possible break in housing.

But Housing Can Cost Too Much

The Wyatt program has many good features. The emphasis on prefabrication, though perhaps overoptimistic, is hopefully modern. The emphasis on local collaboration in solving housing problems which are inevitably in large part local should lead to permanently valuable results. The vigorous mobilizing of 300,000 temporary dwellings to meet at high speed some of the most desperate shortage is all to the good.

The main trouble with the program is that it does not pay enough attention to the economic havoc which may be created in the process of trying to meet its excessive goals. As a nation, we should be and are willing to pay a high price to get adequate housing. But the price will be too high if we:

1. Give the veteran a bad bargain by selling him an over-priced house.
2. Cripple industrial production needed to create good jobs for veterans, and
3. Touch off a disastrous inflationary sequence in the process.

These pitfalls can be avoided. All of us, including the veterans, have a common interest in seeing that they are avoided.

President, McGraw-Hill Publishing Co., Inc.

Electrical World

MAY 25, 1946

The Public Does Not Want Service to Stop

Strikes in the electric utility industry are not something new—they are almost as old as the industry. In the quarter of a century of 1881-1905 there were 85 strikes in this industry. In the past twelve years there have been 81 strikes. However, in the earlier period only 4,400 workers were affected while in the later years over 19,000 were involved.

That is only the statistical side of the story. In the years prior to 1905 electric service could have been shut down at any time and stayed down for several days and no community would have been greatly inconvenienced outside of loss of electric street car transportation, let alone be crippled. Today exactly the reverse is true.

Every city and even most of the farms operate with electricity. When service is down for any reason people are prevented from working, health is endangered, pleasure and amusements are cut off, food spoils, crime goes into high gear at night —all the essential activities of a community are halted and the public welfare becomes secondary to that of a small group of men. Never is the number of strikers large—the largest average in any one year was 500 workers per strike. Yet, the grievances and demands of but a handful of men can and have been put ahead of the well being of hundreds of thousands of people.

It is because electricity has become so much a part of the everyday living, working, health, recreation, transportation and education of almost every member of the public that people are becoming alarmed over every possibility of loss of service, especially those that are man-made.

Other commodities also enter into our everyday lives, but they can for the most part be stored up ahead of time or their use can be deferred for several days without too much discomfort. A steel strike, for instance, could last several weeks without the general public becoming aware of any personal effects. The coal strike, likewise, had to be in effect over a month before the public became conscious of how seriously it might hit home. Even during the telephone strike the subscriber could get emergency service.

With electricity, however, there is no carryover. The moment service stops, even if in the middle of the night, the public feels it. Its effect is instantaneous—it differs from death only in the fact that it can be brought back to life.

Control of such a situation shuold not be in the hands of a few men to use it for bartering purposes. Of that the public is convinced and unless management and organized labor in the electric utility industry are willing to accept their responsibility to the public they will find the public taking matters into its own hands.

There is no class of men in all this country strong enough to defy the public and get away with it. Although the public is long-suffering and appears at times as though willing to put up with

almost anything to avoid an issue, sooner or later its will is done.

Today the public is making up its mind. It knows what it wants—at least it does with respect to utility service. It is a decision which has been arrived at with the customary American fairness and understanding.

In fact, it is remarkable how much more clearly the public thinks on these matters and how much more sure it is of what it wants than are those in government authority who are supposed to be carrying out the desires of the people.

For instance, in a survey of customers of some seventeen properties where power company strikes had either occurred recently or had been threatened the users of electric service, while not willing to deny the right to strike to factory workers, when it came to utility workers were definitely unwilling to permit them to strike. This survey which was made last month for ELECTRICAL WORLD, and is analyzed in full in this issue, corroborates a recent Gallup poll that indicated the extent to which the public is opposed to electric utility strikes.

Regardless of all the disclaimers made against compulsory arbitration the users of electric service are almost unanimously in favor of arbitration as a means for settling utility strikes. Two-thirds of them believe that legislation providing for cooling-off periods and fact finding will be effective. But failing settlement the public expects government to take over the struck properties and operate them until the matter is settled. In other words, the public does not want service to stop.

There is neither resentment against the workers, nor any thought that the utilities are unfair to their people, but interestingly enough the users of service do not believe that steady work, security and other employment benefits are any substitute for pay in the envelope. If workers in other industries in the locality get raises the utility workers, they feel, are entitled to the same.

This is accentuated because, while in the past security and other advantages could be used to attract and hold people, the new order says—what's in the pay envelope? Moreover, the public is inclined to side with the workers on this point. Use steadiness of employment, sick benefits, and all the other social advantages as evidences of a good place to work, but let them be plus values. It's just the same as a store which provides delivery, credit and other services. The public will trade next door if the price is a few cents less for the same quality merchandise.

Also it won't do to attempt to hide behind regulation in collective bargaining because the public is now pretty well conditioned to the fact that higher wages and other costs are bound to be reflected in higher prices. If it happens with steel and meat, why not with electricity? So the public has no hesitance in saying that it is willing to pay higher rates if required by wage increases.

In other words, the public is fair and reasonable. That stands out so clearly in this opinion survey as perhaps to be startling to many utility managements that have been afraid to let the public into their confidence.

Public opinion is the fairest and most intelligent court in all the land, provided it has all the facts. Not only that, but public opinion is kind to those who make every effort to do the right thing. It is very quick to turn on those who are standoffish, or who insist on doing things their way regardless.

When a strike is threatened the most important thing to the public is maintenance of service. Nothing else counts when that is in jeopardy. That is the time when, regardless of previous good relations, the public will turn in an instant against labor or management if it is convinced that either is not doing everything it can to prevent a work stoppage—and that goes doubly for legislators and elected government officials who are fumbling the ball in the hopes that time will be called before they have to run with it.

This issue with its history of utility strikes, its statistics on union membership and wages, its analysis of recent legislative activity and finally its customer opinion survey—all data never before compiled—will, we hope, give members of the industry and others a broader understanding and appreciation of the necessity for sound industrial relations. Remember always—

The public does not want its service stopped.

STRIKES against electric utilities

Not a new thing in the industry, but only of late years have strikes affected continuity of service and thus made the public conscious of them

THE ELECTRIC POWER industry traditionally has been less affected by strikes than many other basic industries and industries generally classified as public utilities. It has not, however, been strike free.

As a result of its relatively small amount of labor trouble sufficiently serious to result in strike action, the increased number of work stoppages of recent years has come as somewhat of a surprise. Of much greater importance, the increased effectiveness—as far as the ultimate consumer is concerned—of electric utility strikes of recent years, has come as considerable of a shock to industries and householders who have long been accustomed to continuous, dependable service, interrupted only most infrequently and then principally through acts of God.

Since the U. S. Department of Labor records 85 electric light and power strikes involving 4,421 workers in the years from 1881 to 1905, it is apparent that strikes in the industry are not a product of the last decade. But the industry's "continuous service" record is almost in complete opposition to that of the coal industry, for example, which has been plagued long and often by strikes, to a point where a portion of its market has been materially affected (anthracite coal vs. oil for domestic space-heating). Thus emphasis is redoubled when electric power strikes not only increase in number but suddenly—as they have more and more often in the last decade—begin to shut down service for several hours or days.

No Service Interruptions

One explanation for the growing tendency of strikes in the electric power industry to disrupt or halt service is that before the vast growth in organized labor dating from 1934, the electric power industry was primarily organized—where it was organized—by the International Brotherhood of Electrical Workers, an American Federation of Labor affiliate. While IBEW has become more and more of an industrial union in recent years, i.e., has turned toward the representation of all employes in an electric utility rather than merely those who could more or less accurately be classified as electrical workers, its history in earlier days seems primarily to have been one of organizing the electrical craftsmen employed by electric utilities. Thus, it is not difficult to understand how the electric power business could have had strikes without having had many service interruptions. As has been demonstrated in several instances, linemen can strike without halting service.

From 1905 until 1927, the history of electric power strikes is obscured by the fact that U. S. Labor Department statistics for these years were not so maintained as to show how many there were in this industry. From 1927 until 1934, these statistics show, there were no electric power strikes. Starting in 1934, however, when the organization of labor unions began markedly to expand under the impact of the National Industrial Recovery Act, the incidence of electric power strikes has risen, not to alarming statistical proportions, to be sure, but nevertheless steadily upward. The average number of workers involved has tended to be higher in recent years, although no real trend is discernible in this regard over the past 12 years. Neither have real trends developed in man-days idle or average duration of strikes.

Thus, the factor of strike effectiveness, as regards interruption of service, seems primarily to be responsible for the emphatic feeling of concern which is now manifest regarding strikes against electric utilities.

A factor which certainly has had its effect in stimulating public as well as industry concern over power strikes is the treatment utility strikes or strike threats receive in the daily press. Since the possibility of a curtailment of service is a dramatic one, it is naturally enough played up in a daily press which has in the last 12 years become ever so conscious of the news value of

labor disputes. How much of the public and industry concern is traceable to the treatment accorded utility strikes in the daily press cannot accurately be ascertained. It must, however, be apparent that such a prolonged strike threat as that which recently faced the Virginia Electric & Power Co., and such a dramatic solution of the immediate problem as was employed therein by the governor of Virginia, occasioned considerable publicity. It would seem a logical assumption that such publicity has its effect in shaping public opinion on the whole question of utility strikes, or, more accurately, strikes against the public convenience.

It Can Happen Here

Public opinion appears now to be a most consequential factor governing the incidence of actual electric utility strikes which interrupt service. Apparently, both the public and large segments of utility management relied for years upon the belief that "it can't happen here," that utility employees would not halt service, particularly to such vital consumers as hospitals, war industries, water and sewage systems, dairies and the like. It seems entirely reasonable to believe that the natural hesitancy so to disrupt modern life has been a very important factor in many situations where strikes were threatened or were entirely possible. But the belief must now be that "it can happen here," for it has happened in numerous localities and with sufficient effectiveness as to demonstrate that service can and will be interrupted when the local ignition point is reached. There have been strikes which halted service completely. There have been strikes which failed noticeably to affect service. There have been very short strikes and rather long strikes. Some seem to have been the actions of normally tractable men who felt themselves goaded beyond endurance, and some seem to have been the whimsies of men who failed utterly to comprehend the significance of their jobs and their actions.

About the only serious eventuality which seems not to have transpired in the way of electric power strikes is the deliberate cutting off of all energy production by the struck system and concurrent severance of all interconnections through which energy could be imported by that system. This has been threatened, but seems not to have been achieved.

That organized labor is cognizant of public opinion regarding utility strikes is shown by the comment of one of the organizers of the UWU-CIO, who told the recent organizing convention at Atlantic City that where the union felt strike action necessary, it might find it wise to call out only non-operating workers, allowing service to continue uninterrupted but halting the issuance and collection of bills and similar operations whose curtailment would embarrass the company but not materially and immediately affect the public.

One of the issues which will have to be resolved by both management and labor in their strivings toward understanding is that of job and pay standardization, equal pay for comparable jobs. There seems today to be relatively little precision within the industry as a whole in job nomenclature, content and pay. In general, a lineman's work may be claimed to be the same wherever it is performed, but one company will have four categories of linemen, others only two or three. A coal handler in one plant may have a heavy manual job, while in another he will have a relatively easy time but be required to operate costly machinery efficiently. Just how this job standardization, regardless of actual duties, is to be effected, and how the inevitable, residual inequities are justly to be met in the pay scale is a difficult matter, but it is one for which the unions are pressing and one which an increasing number of companies seem to be interested in, at least within their own systems. Company managements must be prepared to defend their positions against comparisons with systems far distant and different and therefore not truly comparable.

Indicative of some of the diversities and complications which have arisen in past power strikes are the following case histories:

Lower Colorado River Authority

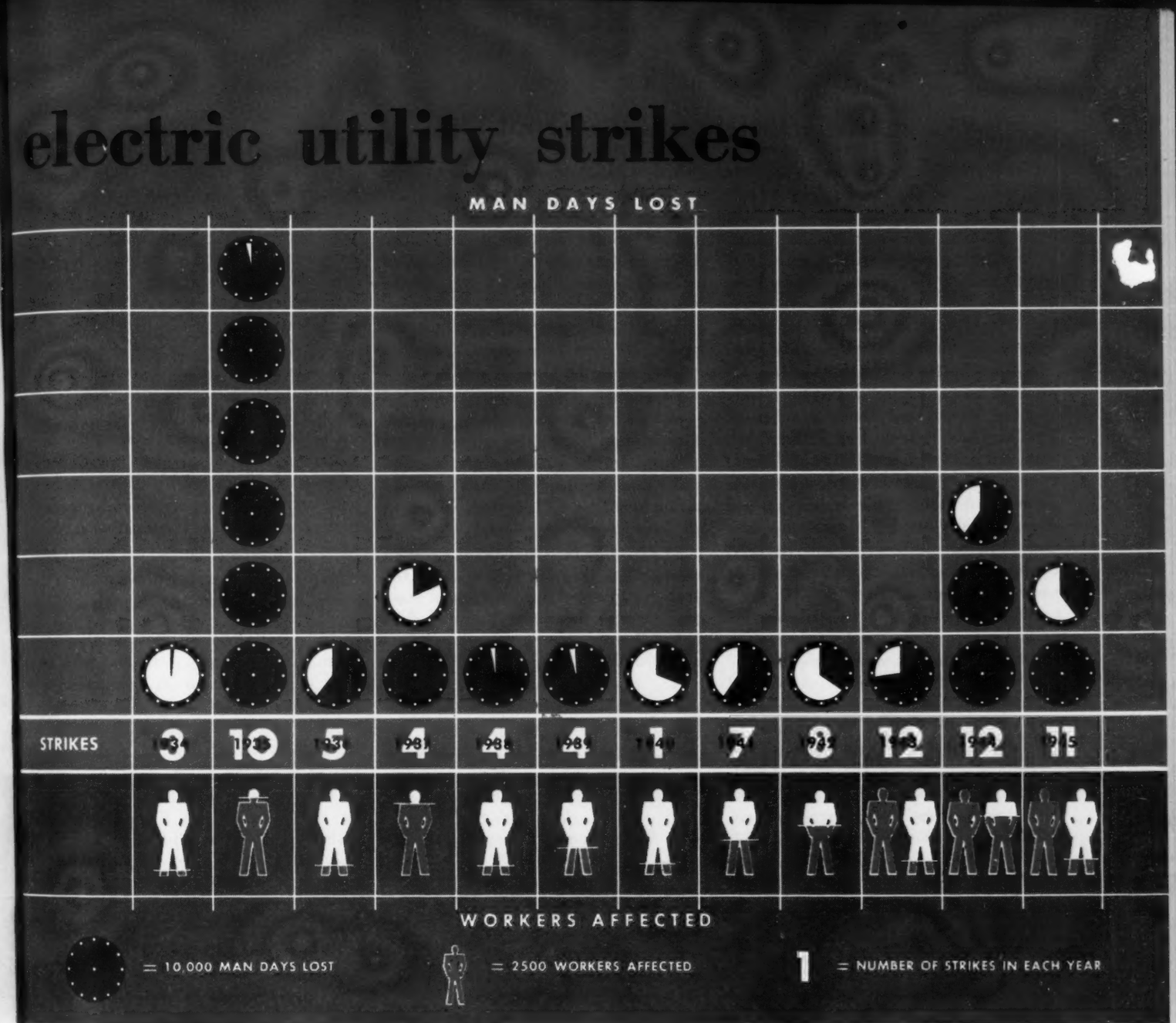
Outstanding among strikes which have halted electric power service to sizable bodies of customers for more than just a few hours is the stoppage which closed down the Lower Colorado River Authority for about a day and a half last fall.

LCRA, with headquarters in Austin, Tex., is a state agency operating four hydro plants in Texas. Its employes were represented by the International Brotherhood of Electrical Workers.

The strike, which occurred at midnight, October 1, 1945, was outstanding in two respects. For one thing, it cost the strikers their jobs, an eventuality sufficiently rare these days to merit attention. For another, it was accompanied, and was followed, by a certain amount of violence upon the system's property. The stoppage resulted from attempts by IBEW to obtain recognition as exclusive bargaining agent for workers. The authority, through its manager, Max Starcke, and its board of directors, insisted that, being a state agency, the Authority could not enter into a contract with a labor union.

Some lines were cut and minor damage was done to powerhouse equipment, but there was never any prosecution of the misdemeanor charges filed against a few former employes. State and local police were called upon to protect property in several of the towns served by LCRA. Since the strike ended, four other offenses against the system's property have oc-

YEAR	STRIKES	WORKERS AFFECTED	MAN-DAYS LOST
1945....	11	3,300	14,000
1944....	12	4,400	26,000
1943....	12	3,000	7,300
1942....	8	1,475	3,400
1941....	7	975	6,000
1940....	1	328	300
1939....	4	883	9,797
1938....	4	290	9,900
1937....	4	2,000	12,000
1936....	5	325	6,000
1935....	10	2,287	59,817
1934....	3	75	400
1933 thru 1927....	0	0	0
1926 to 1905 ...	No statistics available for these years		
1905 to 1881....	85	4,421	.....



curred, according to Starcke, who adds that they took place at about monthly intervals and always on a Saturday night.

First was the severing of a 138-kv. line which fell across a smaller line. Major damage was prevented by circuit breakers. Then three poles of a high-voltage line serving as a tie with the Texas Power & Light system were cut. Thereafter, a pole and guy wires on a line to the town of Lampasas were partially severed, but were discovered before an outage took place. Last incident, in March, saw the oil drained from several transformers at separated points. Police spent some time investigating this incident, described by Starcke as the most serious of the four that had occurred.

After the strike was precipitated by a walkout of 86 of 191 powerhouse workers and linemen, it took about 36 hours to restore service to most points on the system. In some remote areas, it took twice as long to restore service.

LCRA promptly fired the strikers, who, Starcke said, quit without ultimatum or other notice of dissatisfaction to LCRA than what was obtained from union officials seeking to negotiate a new contract. New workers were hired, and the management insisted that none of the strikers would ever get their jobs back.

The precise validity of LCRA's insistence that it is powerless to contract with a labor union seems not to have been settled at law, although for practical purposes, the Authority's ability to recruit new workers and carry on operations seems rather conclusive in view of the difficulty encountered in doing likewise by employers who are subject to the National Labor Relations Act. The Texas Supreme Court has ruled in a case involving the legality of tax payments or payments in lieu of taxes by the Authority that they may not be made because the authority is a state agency.

Consumers Power Co.

One of the more ineffective strikes against an electric utility was that called by the Utility Workers of America, CIO, against the Consumers Power Co., of Jackson, Mich., last October 18.

The strike grew out of a wage dispute in which the union demanded a

Strikes against electric utilities (cont.)

30-cent per hour increase while the company offered 10 cents. A state mediation panel offered a 13-cent boost which was turned down.

Linemen, repairmen, construction crews and garagemen were among those who walked out. Emergency supervisory crews kept the large fuel plants operating and almost no electric service interruptions were experienced, although on the second day of the strike, central steam heat for a number of buildings in Jackson and Battle Creek was temporarily shut off until emergency crews could restore service. At one point during the strike, several feeder lines at the Muskegon plant were pulled, but service was restored promptly. Later, those responsible were dismissed.

On the morning of the strike's third day, union officials accepted a compromise settlement which provided for 13-cent an hour increase and several minor adjustments for specific classes of employees. The settlement was to extend until last March 1 unless the nation wage pattern should so be altered as to warrant reopening. Last March 1, a new settlement was negotiated promptly which provided an additional four cents, for a total pay boost of 17 cents per hour. No difficulty was encountered in reaching the settlement last March.

Cleveland Electric Illuminating Co.

One of the most serious strikes interfering with war production was that called against the Cleveland Electric Illuminating Co. January 12, 1945, by the Utility Workers Organizing Committee-CIO, which represented about 1,800 operational, maintenance and construction employees. The strike was called in violation of a no-strike clause in the then-effective contract.

Shortly before 8 a.m., January 12, a union steward at one of CEI's two steam heating plants, who had failed to report as scheduled for duty on the preceding midnight shift, demanded work on the day shift. This was refused. He then ordered coal-handling employees in the plant to strike, which some of them did.

Company appeals to local and national union officers for a resumption of work by the strikers were in vain, and the stoppage spread rapidly throughout the CEI system, affecting all three generating plants. The company appealed to four federal agencies asking that the Army take over the property to avoid a disruption of service. One of them, the National War Labor Board, ordered the union to resume work immediately.

About 5 p.m., January 12, with the strike continuing, the union presented nine demands on the company, one insisting upon a 7-cent per hour wage boost which had been refused by NWLB not long before the strike. Three other demands dealt with the strike itself. While negotiations between the company and the union were underway, the Office of War Utilities directed the company to ask its largest industrial consumers to curtail energy requirements by cutting production 50 to 75 percent. This came as coal bunkers at the generating plants, which had been largely full when the strike started, were becoming very depleted. About 50 large plants complied with the request, sending thousands of workers home. The production loss, although large, has never accurately been estimated. Federal seizure was ordered at about midnight, and the Army took over the system at 4:15 a.m., January 13, continuing in possession until 7 p.m. January 15. Electric service and steam heating were completely restored within five hours after the Army took over. At no time was service to other than the 50 large war plants affected.

For several days before the strike, severe weather had interfered with coal supply to CEI plants. To conserve what it had, CEI had been purchasing up to 60,000 kw. from interconnected systems. This supply was continued at about the same level while the strike was on. While union officials made some comment about sympathy action against the interconnections, none was taken.

Los Angeles Municipal System

The most severe winter weather in more than a decade combined with a week's accumulation of maintenance work to make effective a strike of about 2,500 employees of the Los Angeles Municipal Department of Water and Power February 14-24, 1944.

Although it was called and directed by the International Brotherhood of Electrical Workers, AFL, the strike at one point was described by its leader as "not an IBEW strike" but rather a strike of employees of the Department. It began Monday, February 14, with the strikers insisting on a $15 monthly raise. For several days, there were no noticeable effects as the transmission line from Boulder dam, over which was supplied 85 percent of the municipal system's load, continued in service. The union furnished whatever men were needed to maintain essential service to hospitals and war plants, and some employees stayed on

A utility personnel director:

"Utility management probably has not kept pace with the times, particularly as regards the training of supervisors, who are management's first and broadest contact with labor—one unfortunate situation is the feeling among CIO unions that a strike vote or threat is the only way in which business can be done—there must be recognition by unions, or legislation forcing it, of union responsibility and the need for honoring contracts. As for future strikes, the electric power industry is in for it along with other industries. The fear of halting service seems to be fading away."

the job. On the third day, the system's general manager reported that there had been no failures of power or water due to the strike. The picture changed somewhat in the subsequent 24 hours, for the next day's report was that there had been no outstanding failure of power or water and none at all to essential users. On the fifth day, patrolmen assigned to the Boulder-Los Angeles transmission line, walked off the job. The line remained in service throughout the strike. On the sixth day a line serving the Wilmington district failed, cutting off some non-war production, sewage treatment and a number of homes. The union refused repairmen on the grounds that no war production was affected. In other instances of trouble not affecting war production, repairmen would remove any danger to passersby, but would not restore service unless necessary to war production.

The seventh day saw a snow, rain and hail storm, described as the worst in 13 years, hit the entire Los Angeles area, and the municipal system rapidly went to pieces under the impact of falling trees, short circuits and no repairs. Police estimated a minimum of 65,000 homes without service and 5,000 street lights dark. A few union men were available, but only to remove dangerous conditions. Towards the end of the stoppage, strikers failed even to remove dangerous conditions. Thus system officials were forced to drop circuits which curtailed service to many consumers, just to avoid possible accidents. On the eighth day, starting the second work-week of the strike, 82 war plants and an undisclosed number of other establishments were idle for want of electric service. Renewed storms on the ninth day completed the job and city officials retreated from their earlier refusal to call on the federal government for help. At this point, 160-odd war plants were idle for want of energy and up to 125,000 homes were without service. Federal officials began to take steps to avert food spoilage, the city was swamped with requests for assistance from service-less citizens, and the union announced that it would no longer furnish men to fix lines to war plants.

On the 10th morning, the Army took over the system under an executive order, and at midnight, February 24, announced that 95 percent of the 2,500 strikers had returned to work. Fifty-three of 187 stalled war plants were back on the line, the Army added, and 80,000 of 125,000 homes. On February 25, all was back to normal. The system was turned back to the city February 29.

Kansas City Power & Light Co.

One of the rare instances where central station electric service was completely cut off occurred in Kansas City early September 17, 1941, when an IBEW union representing production employees closed down generating plants of the Kansas City Power & Light Co. for almost four and one-half hours.

The strike itself came without warning some hours after the National Defense Mediation Board, meeting in Washington, had turned IBEW down on request for certification as bargaining agent for 200 overhead and about a dozen commercial steam workers who were then represented by an independent union. When NDMB ruled against them early in the evening of September 16, word was flashed to Kansas City, and at 11:57 p.m., the strike was called, involving 102 men in the Northeast plant and 78 in the Grand Avenue plant. Not all workers in these plants walked out and a few returned. With these men non-strikers, and supervisory personnel, the company began picking up load again at 4:20 a.m. September 17. Conditions in the plants were not restored to normal until the 7 a.m. shift, September 19, but little if any load was lost after 4:20 a.m., September 17.

During the period of the blackout, no central station service was available to KCP&L customers, a circumstance which was mitigated by the fact that the interruption occurred during hours when consumption is normally at its lowest point. City officials were sufficiently moved to criticize the stoppage roundly. City council passed a resolution of censure, and the police chief threatened criminal charges if deaths could be demonstrated to result in darkened hospitals as a result of the strike.

Pennsylvania Power & Light Co.

One of the few power strikes to which any direct loss of war production could be traced was that staged by a few employees of the Pennsylvania Power & Light Co., of Allentown, Pa., at the company's Pine Grove and Hauto plants.

The strike, which began December 10, 1943, and ended five days later, cost one day's production of anthracite by 7,000 miners employed at nearby collieries and about 300 tons' production of steel in the electric furnaces of the Bethlehem Steel Co. Throughout the remainder of the five-day tie-up, supervisory employees and workers who refused to strike kept equipment operating at capacity in the Pine Grove and at about half of capacity at Hauto. Probably no war load would have been dropped at all except for the fact that the plant hit hardest by the walkout supplied 25-cycle energy to the mines and steel mills.

The PP&L strike arose over the efforts of the Utility Workers of America, (CIO) to represent its own members, and extend its membership in PP&L properties, despite the existence of a collective bargaining agreement between the company and the Employees Independent Association.

Direct cause of the strike was the disciplining of a boiler operator at Pine Grove. Less than half the Pine

An operating company executive:

"Electric utilities have a very substantial type of person working for them. Most state commissions are very decent about allowing wage boosts as operating expenses. Thus, there doesn't seem to be much reason for a company to get into a position where it might be struck. Of course, strikes are the thing to do today."

Strikes against electric utilities (cont.)

Grove crew went out in the subsequent strike, and little trouble was encountered keeping that station operating. At Hauto, the entire crew struck, and even the maintenance crew walked out without replacement after a short time, leaving only supervisory personnel to operate the plant.

This strike, still regarded in Washington as one which was outstanding in demonstrating the extent to which the War Labor Board could be slugged into discarding principle for the expediency of politics, has been followed by considerable turmoil as the UWA has broadened its membership. The EIA remains bargaining agent under a recent NLRB election, but the vote showed the UWA to have lost by less than 300 votes, a margin it could not have begun to achieve at the time of the strike.

Duquesne Light Co.

Whether or not the strike which paralyzed Pittsburgh's commercial life for 19.5 hours on February 12 was the most serious single power strike in the nation's history, as some Pittsburghers claim, is not wholly clear. Beyond question, it ranks high on the list.

It was called by the Independent Association of Employes of the Duquesne Light Co. and affiliated companies and started at 4 a.m., February 12, 1946, continuing until 11:30 p.m. the same day when it was terminated. Residential service was never cut off during that period, although occasionally scattered sections were cut off from service for short intervals to maintain load. The company and city officials made repeated requests that consumers cut down on their use of energy as greatly as possible. Newspapers and radio stations broadcast these appeals which were unusually effective.

Commercially, the strike's effect was drastic. Street car service was stopped. Schools were closed. Elevator service was sharply curtailed, if not halted, in downtown office buildings and hotels.

Effects of the strike on industrial consumers are not easily defined, for a certain number of industrials in the area maintain their own generating equipment. In addition, the steel strike was then in progress, a fact which lowered appreciably the demand on the Duquesne system that day.

The company, through the use of its supervisory and other personnel, maintained operations at its Colfax and Reed stations, obtaining therefrom 62,000 kw. of capacity. Another 61,000 kw. came from interconnections with West Penn Power Co., Pennsylvania Power Co., and a third system. Finally, the company received 49,000 kw. from industrial plants. This totalled up to 172,000 kw., which was the peak load during the strike, occurring between 8 and 9 p.m. February 12.

The strike followed long negotiations between the union and Duquesne, negotiations which had been marked by a brief strike of 14 workers, members of the United Mine Workers' District 50, at the Colfax plant which began and ended November 6, 1945. Following the February 12 stoppage, negotiations were carried on and a second strike call was issued for 12:01 a.m., February 26. This was rescinded half an hour before the stoppage was to have taken effect. The union agreed to a one-week delay to allow its membership an opportunity to vote on accepting arbitration, which the company had accepted February 24. Arbitration was accepted by the union March 1, and a settlement made public April 12, which provided an 18-cent per hour increase across the board.

Virginia Electric & Power Co.

A threatened strike by the International Brotherhood of Electrical Workers (AFL) against the Virginia Electric & Power Co. system called for April 1, never materialized as the contesting parties got together on an arbitration agreement.

The strike threat itself, however, deserves a place in the history of electric utility labor disputes, for it ended under a cloud of state action so drastic and rare as to be almost unprecedented. After some weeks of warning both the company and the union that he had no intention of permitting the state to go without electric power service, Gov. William Tuck drafted all male employees between the ages of 16 and 55 into the unorganized state militia, announced that they would be furloughed to their jobs and called attention to the provisions of state law providing court martial and a $200 and/or 200 days punishment for conviction of failing to obey orders. The action was taken under a section of the state code which requires the company to provide electric service, and under a 1930 codification of an old law which places male citizens under the power of the state for militia purposes when necessary.

Tuck asserted that his action was taken "for the sole purpose of seeing that power plants will be kept open."

Although Tuck insisted that he was acting fully within the law and attempting rather to protect the public than to abridge the right to strike, his action was attacked as unlawful by IBEW and AFL officials, among them President William Green of the AFL. Green declared that the drafting of VEPCO workers was an attempt to force men to work against their will and asserted:

"We'll never acquiesce in that policy."

Tuck's move, coming after repeated assertions that the plants would be kept open regardless and failing to be based solely on the obvious move of seizing the properties, evoked widespread comment as to legality and enforceability. Although no legal test of his program was had, sentiment seemed to be that Tuck had the right to draft male citizens into the militia, but that whether he could successfully require them to work in the power plants after doing so was another matter.

An operating company executive:

"The strike trend seems to be settling down somewhat. I think it was due to faulty leadership by union people, for the companies are cooperating well enough, even if not to the satisfaction of the union."

In the OPINION* of the CUSTOMERS

1— Utility workers should not be permitted to strike, but

2— Despite employment benefits utility workers are entitled to as large a wage increase as is paid in other industries and to that end

3— They would be willing to pay a higher light bill if necessary to enable workers to get higher wages. Utility rates are not high

4— Utilities are fair in dealing with their employees

5— Utility workers are paid the same as or more than factory workers

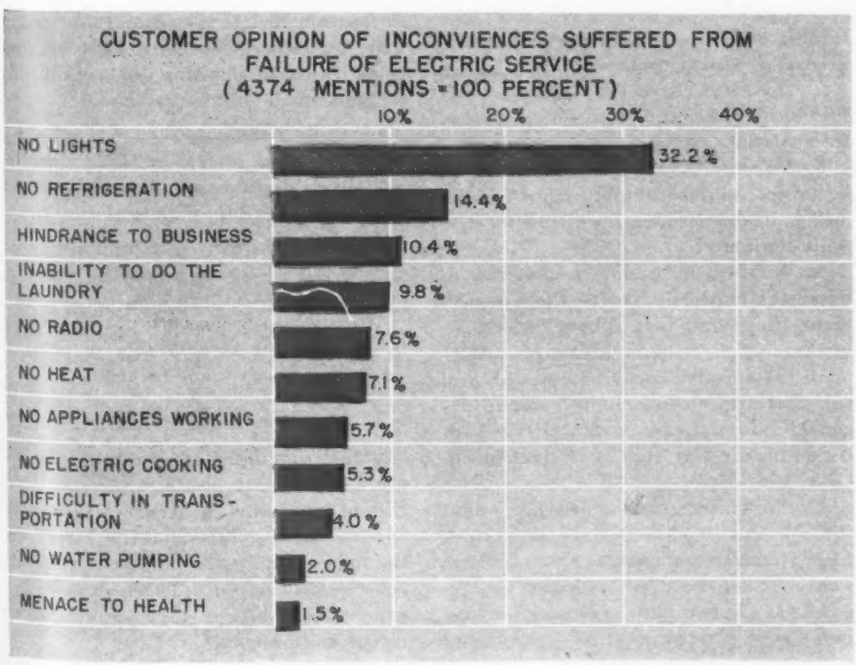
6— The blame for disturbed labor relations can be laid at the door of labor more often than at the door of management

7— A utility workers' union is more to be censured for violating a labor agreement than the company

8— Cooling off periods and fact finding will help prevent utility strikes but

9— All threatened strikes should be arbitrated

10—If a strike occurs the government should take over and operate the struck utility.



THESE OPINIONS are disclosed in detail in the following report of a survey made by McGraw-Hill Research for ELECTRICAL WORLD. The survey had three objectives.

Because of the recent wave of strike threats in the industry the first objective was to determine the attitudes of electric utility customers in regard to such strikes. It was logical to assume that such attitudes would be more definite among customers in areas where in recent years work stoppages had occurred or had been threatened and the survey was confined to those areas.

The second objective was to ascertain customer reactions to methods that are being tried and suggested as means to reduce the incidence of strikes against electric utilities.

The third objective was to find out how customers would be or had been most inconvenienced by electric utility strikes. The report on that is short and shows that no lights, no refrigeration and hindrance to business, in that order of 32.2, 14.4 and 10.4 percent of mentions, were the three leading inconveniences. These and other inconveniences cited are shown in the graph at the left.

A survey of about 1,800 interviews was agreed upon as sufficient for a valid disclosure of opinion. Actually, 1,819* interviews were secured in the following geographical distribution:

New England, 23;
Middle Atlantic, 625;
East North Central, 521;
West North Central, 277;
Southern, 125;
Pacific Coast, 247.

*One return, otherwise complete and included in the compilations, did not show where it came from.

The numbers of interviews in the various regions vary from population ratios because they were set by the incidence of strikes or threats of strikes.

The basic pattern of the survey was to interview representative groups of electric utility customers who, in their businesses or in their homes, were the persons primarily concerned with the electric service bills. This required the assignment of desired interviews in proportionate ratios among groups of customers and resulted in the following distribution of respondents (Designations in parantheses are those used for brevity in tabulations on following pages.):

CUSTOMER GROUPS	PERCENT
Professional or office (Offices)	14
Residential (Homes)	55
Manufacturers (Factories)	7
Municipal Officials (City)	5
Stores (Stores)	10
Farmers (Farms)	8
No answer (Unidentified) on report form	1

Another consideration was to obtain the viewpoints according to the economic status of the respondents. This was done on ratios ordinarily used for such determination. Analysis of returns showed the following distribution:

RESPONDENT	PERCENT
Prosperous	10
Average Plus	25
Average	33
Below Average	29
No answer on report form	3

Other distributions of respondents according to education, age and sex appear in accompanying tabulations.

Interviews were obtained in homes (59 percent) and in places of business (39 percent). A few reports (2 percent) did not include this information.

Union membership was stated by 12 percent of the respondents; 87 percent were not union members. Statement on this point was missing from 1 percent of the returns. Union affiliations were given: A.F.L., 47 percent; C.I.O., 29 percent; Others, 7 percent; no answer, 17 percent.

After all returns had been coded and tabulated, 10 percent taken at random were re-checked by field supervisors of McGraw-Hill Research to see if the responses had been faithfully and accurately reported. No discrepancies were found.

No employees of electric utilities were interviewed and all interviews were with persons directly concerned with paying the electric service bill. These two points were definitely determined before the set questions of the interview were asked.

AGE DISTRIBUTION OF RESPONDENTS	PERCENT
21–29	18
30–49	51
50 and over	30
No answer on report form	1

EDUCATION OF RESPONDENTS	PERCENT
Elementary	28
High School	43
College	28
No answer on report form	1

SEX DISTRIBUTION OF RESPONDENTS	PERCENT
Male	49
Female	50
No answer on report form	1

In the report of the survey on the following pages the set questions of the interview have in some instances been restated for brevity and convenience in presentation. However, there should be no difficulty in identifying the slightly changed forms with the questions of the interview sheet which are as follows:

1. Do you believe factory workers should be permitted to strike?

2. Do you believe milk drivers should be permitted to strike?

3. Do you believe electric light company workers should be permitted to strike?

4. In the event of a strike in electric light companies, do you believe that the company and its employees should arbitrate their differences?

5. In the event of a strike, do you think the Government should take over and temporarily operate an electric light company?

6. Do you believe that legislation providing for a cooling-off and fact-finding period will help prevent strikes in electric light companies?

7. Do you believe the light company should be subject to punishment by law for violating a labor contract?

8. Do you believe the union should be subject to punishment by law for violating a labor contract with an electric light company?

9. Would you hazard a guess as to who was most at fault—the Government, the company, labor leaders, or workers—for strike or threat of strike?

10. Generally speaking, would you say that the electric light company is considerate and fair in its dealings with its employees, or that it is not considerate and fair?

11. In your opinion, are the wages for workers in electric light companies higher, lower or about the same as wages for workers in factories?

12. If electric light company workers enjoy such benefits as steady year-round employment, security, vacations, and pensions, are they justified in demanding the same wage increase as is being granted workers in other industries?

13. If it means you personally would pay a bigger electric light bill, would you be willing to let the electric light company workers have the same increases as are now being given workers in other industries?

14. Is it your impression that the cost of electricity is high, moderate or low?

15. If electricity goes off because of a strike in an electric light company, in what three ways would you be most inconvenienced?

16. Over-all comments?

Because the over-all comments solicited at the end of the interview are just that and are not especially referred to any one question, they are reproduced in such quantity as space will allow and are interspersed as below wherever place is available for them throughout the presentation of the survey results.

COMMENTS

Believe electric light company should be on job under any circumstance.

●

No strikes should ever be permitted, but the electric light company is charging an exorbitant amount of money for its power—higher here than it is anywhere else.

●

Do not feel there should be strikes where public is strongly affected, but there must be freedom of action—25 persons made statements equal to this.

●

Electric light companies are not on the same flexible wage-scale as other industries.

●

No public service corporation should be permitted to suspend service, no matter how difficult labor troubles.

●

I feel that light company employees are, in a sense, public servants and should not strike because power is needed in hospitals and for safety on the streets; they should have their salaries kept in line with living costs by the utility companies so there would be no necessity to strike.

The Right to Strike

Do you believe that (a) factory workers, (b) milk drivers, (c) electric utility workers, should be permitted to strike?

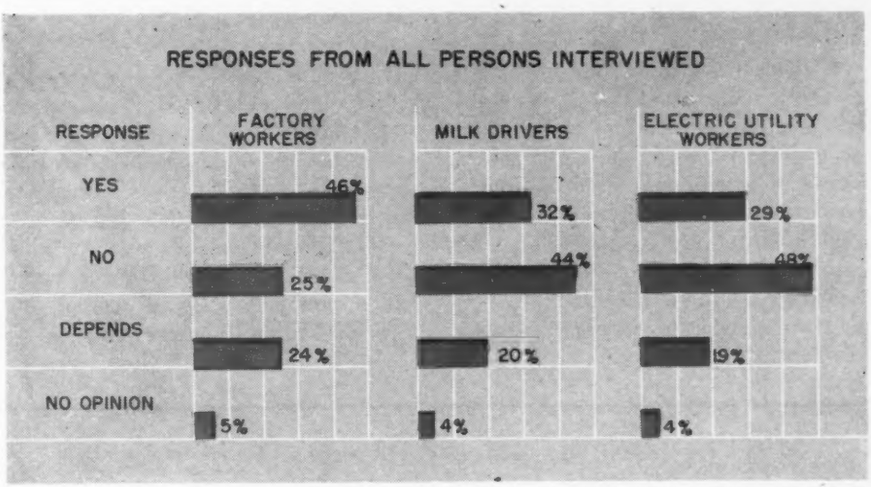
AS THE STRIKE comes closer to being one to cause them immediate inconvenience, fewer people believe that the workers concerned should be permitted to walk off the job. The average man can bear it with reasonable equanimity when the toes of someone else are stepped on, but he reacts quite positively when his own are under the heel. This very human attribute is clearly shown in all aspects in which the replies to the question at the top of this page are viewed.

In considering the opinions disclosed by these replies, it should be kept in mind that the survey here reported was made in areas where a strike of electric utility workers had occurred or had been threatened in recent years. If the survey had not been thus confined, but had encompassed a full cross section of public opinion, it is possible that the results would have been less definitely negative in respect of the utility worker's right to strike. These folks had had their toes stepped on and knew how it felt or they had seen the heel ready to descend.

Only one-quarter of the people interviewed thought that factory workers should not be permitted to strike. But when it was a question of whether or not the morning's milk would appear on the back steps, a much larger number felt that restraint should be imposed. And even more people reflecting on no lights, no refrigeration, no radio and so forth, were of opinion that the electric utility man should not walk out in a labor dispute.

Generally, the farmer is believed to be against strikes of industrial workers. And characteristically, his opinion seems firmer and more widely held when the strike affects food, which is his chief concern. This is clearly shown in his definite majority opinion of "No" in regard to strikes of milk drivers which appears in the analysis of responses according to customer groupings. With electric service becoming an ever larger factor in his production, it is not surprising that the farmer is only a little less positive in negativing strikes of electric utility workers.

Naturally the prosperous people admire the status quo. But it is a little startling to observe, in the tabulation of responses according to economic groupings, that those who live somewhat better than the average appear to have



Responses According To Economic Groupings

RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
Factory Workers?				
Yes	36	49	44	47
No	35	22	25	25
Depends	26	26	27	20
No Opinion	3	3	4	8
Milk Drivers?				
Yes	28	33	31	31
No	52	43	45	41
Depends	16	22	21	20
No Opinion	4	2	3	8
Electric Utility Workers?				
Yes	25	26	30	32
No	57	52	47	41
Depends	15	19	20	21
No Opinion	3	3	3	6

Responses According to Customer Groupings

RESPONSE	OFFICES PERCENT	HOMES PERCENT	FACTORIES PERCENT	CITY PERCENT	STORES PERCENT	FARMERS PERCENT	UNIDENTIFIED PERCENT
Factory Workers?							
Yes	52	44	57	55	46	28	56
No	21	26	21	16	26	40	6
Depends	25	25	19	26	20	26	38
No opinion	2	5	3	3	8	6	0
Milk Drivers?							
Yes	36	31	36	36	34	20	31
No	42	42	43	38	44	59	50
Depends	21	22	17	22	19	16	18
No opinion	1	5	4	4	3	5	0
Electric Utility Workers?							
Yes	32	29	26	26	32	22	44
No	48	46	54	48	45	57	37
Depends	18	21	16	22	19	16	19
No opinion	2	4	4	4	4	5	0

rather more forbearance in regard to strikes in general than do those below them in the economic scale. But here again forbearance lessens in the degree of personal inconvenience caused.

Evidence that strikes are not unanimously popular, that there is a considerable minority opinion against them or undecided among union members, shows up in the analysis according to union and non-union replies. Only slightly more than a majority of union responses indicates opinion that electric utility workers should be permitted to strike. As is to be expected, non-union opinion is much more positive against utility strikes; in fact, the "No's" and "Yes'es" in this column are almost an exact transposition of the union responses.

Clearly in these replies is seen the public opinion that recently caused the legislature of New Jersey to pass a law for seizure and operation of struck utilities by the state, that gave the governor of Virginia courage to draft power company employees into the state militia to hold them on the job, and that will undoubtedly play a part in any labor legislation Congress may pass.

Responses According To Union Membership Or Not

RESPONSE	UNION PERCENT	NON-UNION PERCENT
Factory Workers?		
Yes	67	42
No	14	27
Depends	17	26
No Opinion	2	5
Milk Drivers?		
Yes	53	29
No	27	46
Depends	17	21
No Opinion	3	4
Electric Utility Workers?		
Yes	53	25
No	25	51
Depends	19	20
No Opinion	3	4

COMMENTS

I believe everyone should be permitted to strike, but first they should arbitrate their differences, rather than inconveniencing so many. If others are permitted to strike, I see no reason why light company employees should be excluded, even if it is a public service.

●

I don't think anything that involves people should be run by men permitted to strike. Should have compulsory arbitration where other people are involved as in a light company.

●

Companies should give in because their profits are high enough.

●

No public employees should be allowed to strike. If we will equalize responsibility of union as much as employer—then we will have something. At present unions are devoid of a sense of responsibility and contemptuous of restraint.

It's the workers who lose in strikes, even though they do get what increase they're asking, and electric light workers are not different.

●

Strikes right now are a contagious disease, workers and management should realize trend of our economy is upward and act accordingly without all this foolishness. Light company workers should be a cut above average and realize this sooner than factory workers might.

●

Have candles and kerosene lamp. Am not worried if the electricity should go off. Feel anything the light company does is justified. They have always treated me right and I have dealt with them almost thirty years. Am definitely against anyone striking.

●

Farmers can't go on strike, because the country needs food. The electric light workers are in the same class.

Electric workers should realize their public responsibility.

●

Electric workers received same rate of pay all during depression. Think they have been treated very well and have no need to strike.

●

The government should protect the farmers against utility strikes.

●

Power and light are so important today that a strike there is the same as a strike in the government, police or fire department . . . almost criminal.

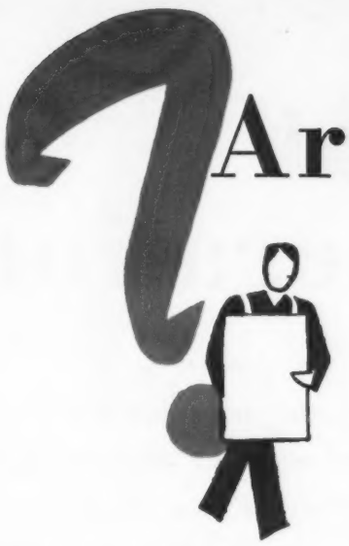
●

I believe so much that they should have a right to strike that I would stay in the dark if it would help the workers.

●

Electric light workers are sure of jobs and will get increases if they deserve them.

Arbitration

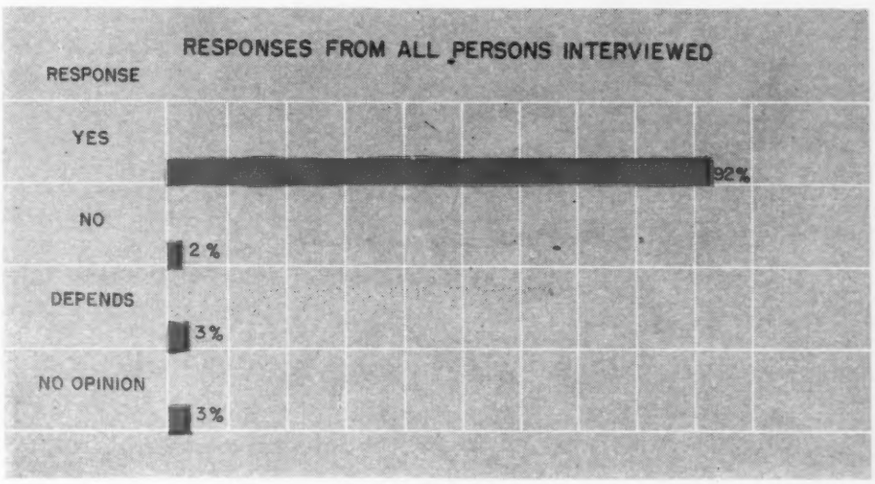


In the event of a strike, do you believe utility and employees should arbitrate their differences?

OPINION, close to being unanimous among customers interviewed, is that differences between electric utility workers and management should be arbitrated. Here, again, is disclosed the concern felt by the average person when it appears that a strike is likely to cause personal inconvenience.

No matter how the replies are examined whether according to customer groupings, economic brackets, union membership, or belief in the utility worker's right to strike, the overwhelming opinion is that such strikes should be arbitrated.

The differences in opinion percentages between the various groups and classifications of respondents are so small as hardly to justify any comments about them. However, perhaps it is pertinent to observe that one would not have expected union members to be as enthusiastic about arbitration as those without union affiliation. Neither was it to be looked for that those people who said they believe utility workers should be permitted to strike, would indicate a stronger leaning towards arbitration than those against such permission.



Responses according to replies to question "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES PERCENT	NO PERCENT	DEPENDS PERCENT	NO OPINION PERCENT
Yes	96	92	92	73
No	1	3	1	..
Depends	2	2	5	5
No Opinion	1	3	2	22

Responses According To Union Membership Or Not

RESPONSE	UNION PERCENT	NON-UNION PERCENT
Yes	93	92
No	1	2
Depends	3	3
No Opinion	3	3

Responses According To Economic Groupings

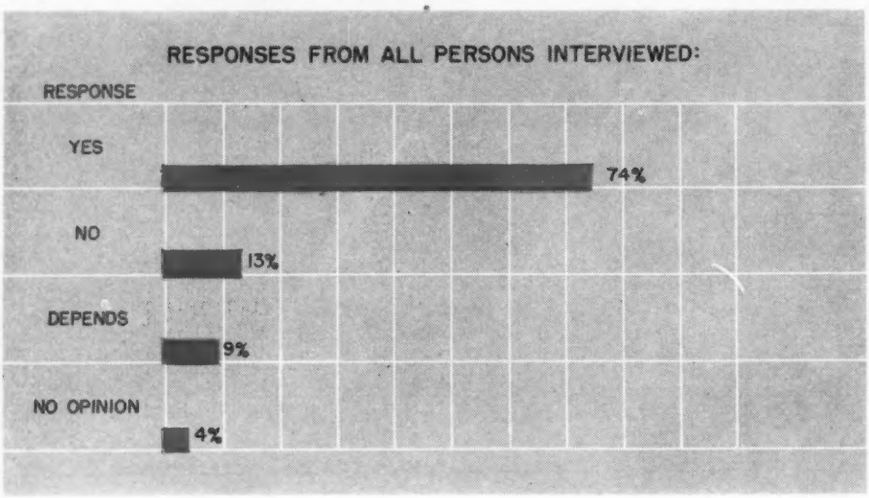
RESPONSE	PROSPEROUS PERCENT	AVERAGE PLUS PERCENT	AVERAGE PERCENT	BELOW AVERAGE PERCENT
Yes	92	95	95	87
No	3	2	1	2
Depends	4	2	2	3
No Opinion	1	1	2	8

Responses According To Customer Groupings

RESPONSE	OFFICES PERCENT	HOMES PERCENT	FACTORIES PERCENT	CITY PERCENT	STORES PERCENT	FARMERS PERCENT	UNIDENTIFIED PERCENT
Yes	95	91	92	94	96	91	94
No	2	2	2	1	..	3	6
Depends	3	2	5	3	3	..	..
No Opinion	..	5	1	2	1	6	..

Government Operation

In the event of a strike, do you think the government should take over the electric utility and operate it until the strike is settled?



GENERALLY, sentiment is in favor of government taking over and operating a struck electric utility. Affirmative replies to the question were received from 3 out of 4 persons interviewed; only 1 out of 8 replies was negative.

Cross tabulations of replies according to different groups and classifications show no highly significant variations from the general result. But it may be worthy of note that the highest percentage indicated for government take-over in the tabulation according to customer groupings is in the column headed "City" which contains the opinions of municipal officials.

The spread between union and non-union opinion, 66 and 75 percent, is large enough to suggest that the union man likes the possibility of government intervention in strike situations less than does the public at large. An even larger difference, 65 as against 80 percent, separates the opinions in favor of government seizure as between those who believe electric utility workers should be permitted to strike and those who think they should not.

Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES	NO	DEPENDS	NO OPINION
	PERCENT	PERCENT	PERCENT	PERCENT
Yes	65	80	73	65
No	18	12	10	5
Depends	13	5	14	5
No Opinion	4	3	3	25

Responses According To Economic Groupings

RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
Yes	73	79	76	67
No	13	11	13	15
Depends	13	8	9	9
No Opinion	1	2	3	9

Responses According to Union Membership Or Not

RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
Yes	66	75
No	21	12
Depends	11	8
No Opinion	2	5

Responses According To Customer Groupings

RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Yes	76	71	71	84	79	70	56
No	15	13	17	7	11	17	44
Depends	8	10	10	8	5	9	..
No Opinion	1	6	2	1	5	4	..

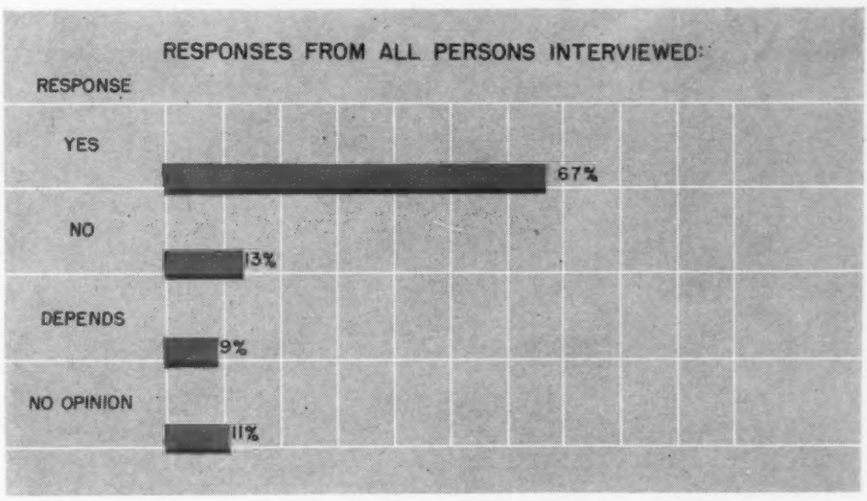
Cooling-Off and Fact-Finding

Do you believe that legislation providing for a cooling-off and fact-finding period will help prevent electric utility strikes?

MORE than 5 out of every 8 persons interviewed think that a period for cooling-off and fact-finding would help prevent strikes of electric utility workers. Only 1 out of 8 believes that such a period would be of no help. The others have no opinion or think it depends on circumstances.

Belief in the efficacy of cooling-off and fact-finding is disclosed as most widely held among city officials in the tabulation of responses according to customer groupings. Next comes the opinion of the white-collar class, as shown in the "Offices" column. Least faith in these expedients appears among "Factories" responses which reflect opinions of people who can be presumed to have had more experience in labor disputes.

No large divergencies of opinions show up in analysis of the responses according to union membership or not, and according to belief whether or not electric utility workers should be permitted to strike. The ratios between opinions in these tables are pretty much the same as in the over-all response.



Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES	NO	DEPENDS	NO OPINION
	PERCENT	PERCENT	PERCENT	PERCENT
Yes	68	68	67	51
No	16	12	10	9
Depends	7	10	14	5
No Opinion	9	10	9	35

Responses According to Union Membership Or Not

RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
Yes	68	67
No	17	12
Depends	8	10
No Opinion	7	11

Responses According To Economic Groupings

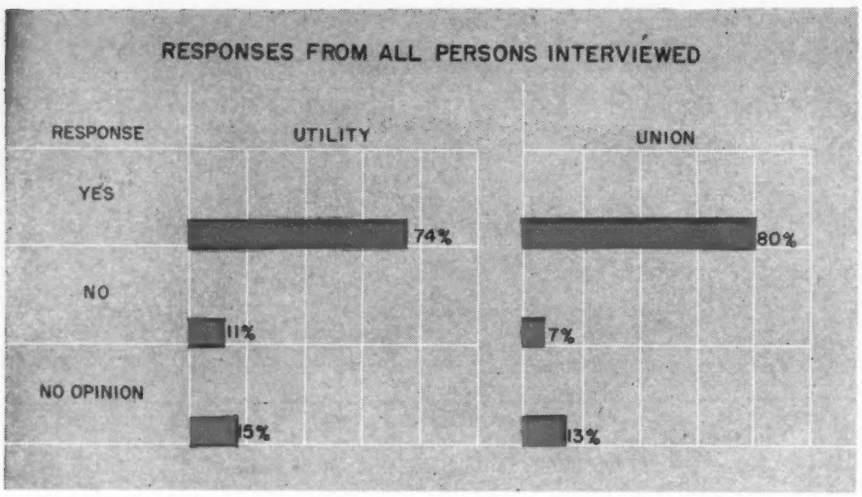
RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
Yes	76	70	66	60
No	14	12	14	13
Depends	6	12	10	9
No Opinion	4	6	10	18

Responses According To Customer Groupings

RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Yes	73	66	61	80	67	64	69
No	10	11	25	8	15	16	25
Depends	12	9	9	8	12	8	..
No Opinion	5	14	5	4	6	12	6

Contract Violations

Do you believe (a) the electric utility, (b) the union, should be subject to punishment by law for violating a labor contract?



THE DISCLOSURE of the survey on this page that slightly more people believe that the union should be subject to punishment by law for violating a labor contract than believe the utility should be so punished, is most interesting. In fairness, of course, punishment for violation of a labor contract should be visited on the violator, whether union or utility. But the fact that 80 percent of the persons interviewed think the union should be punished, and a smaller proportion, 74 percent, nominates the utility for retribution, undoubtedly reflects public irritation that the union is almost wholly free from legal responsibility for its acts, while the employer is held strictly accountable for his.

Responses According To Economic Groupings

	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
UTILITY?	PERCENT	PERCENT	PERCENT	PERCENT
Yes	79	78	74	69
No	14	11	11	11
No Opinion	7	11	15	20
UNION?				
Yes	87	86	81	71
No	5	6	6	10
No Opinion	8	8	13	19

Responses According To Union Membership Or Not

RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
UTILITY?		
Yes	80	73
No	9	12
No Opinion	11	15
UNION?		
Yes	76	80
No	11	7
No Opinion	13	13

Responses According To Customer Groupings

	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
UTILITY?	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Yes	81	71	80	79	74	72	75
No	11	10	13	6	18	13	13
No Opinion	8	19	7	15	8	15	13
UNION?							
Yes	88	76	89	83	83	78	94
No	5	7	5	4	10	10	
No Opinion	7	17	6	13	7	12	6

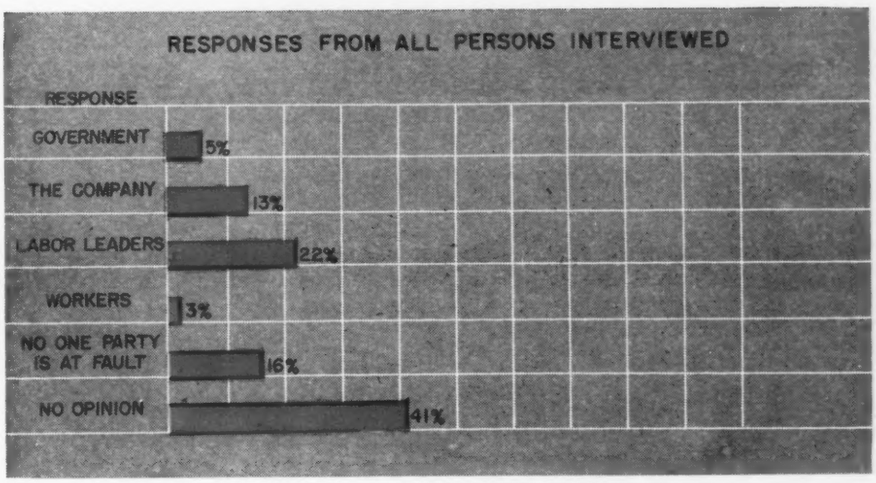
Blame for Strikes

Who, do you think, was at fault for the strike or strike threat against the local utility?

AS STATED earlier in this report, the survey of customer opinion was made in areas where, in recent years, a strike of electric utility workers had occurred or had been threatened. For this reason replies to the question as to who was at fault have greater cogency, perhaps, than would be the case if the survey had been one of general public opinion. At that, however, it is worthwhile to ponder the proportion, 57 percent, of people who had no opinion in the matter or who stated the conclusion, so easily arrived at without thinking, that no one party was at fault.

Leaving aside the replies that assigned no blame to any party or gave no opinion, the response from all those who were asked the question shows that for 21 people who blamed the government, the utility or the workers, there were 22 who said labor leaders were culpable. That is to say, over half of them who have definite opinions on the subject believe the fault lies with the leaders of labor. Less than one-third of the definite opinion put the blame on the company.

In the tabulation according to customer groupings, every group except city officials nominated labor leaders as the guilty parties by considerable margins over the next choice, the company. In the case of farmers' opinions not one thought the utility was to blame, while 27 thought labor leaders were. Next strongest disposition to name the labor leaders is among factory owners and operators.



Going down the economic scale, the trend is for more people to put the blame on the utility for labor disputes, for fewer to say labor leaders are the causes for them. A striking thing about this tabulation according to economic groupings is the apparent tendency to be less tolerant, or perhaps to think more, as economic status declines. This shows up in the opinion, "No one party at fault," which drops from 26 percent among prosperous people to 8 percent among those in below-average circumstances.

It was not to be expected that very many union members would put the blame for utility strikes on labor leaders, certainly not to be expected that for 27 who blame the company there would be 11 to blame the leaders of labor. Perhaps the reversal of opinion as between union members and those without union affiliation on assignment of blame to labor leaders or to the utility can be taken as indicative of organization loyalty. The percentage

Responses According To Union Membership Or Not

RESPONSE	UNION PERCENT	NON-UNION PERCENT
The Government	9	4
The Company	27	11
Labor Leaders	11	24
Workers	1	3
No one party is at fault	17	16
No Opinion	35	42

Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES PERCENT	NO PERCENT	DEPENDS PERCENT	NO OPINION PERCENT
Government	6	4	6	6
Company	25	7	11	16
Labor Leaders	13	30	15	10
Workers	3	5	1	..
No one party	13	16	21	6
No Opinion	40	38	46	62

of union members blaming the government is higher than in any group or class except the storekeepers and the unidentified in the tabulation according to customer groupings.

(Too much weight should not be given to the unidentified opinions which appear on this and on other pages in this issue because the number of them is very small.)

Responses According to Economic Groupings

RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
The Government	7	5	5	4
The Company	7	8	13	21
Labor Leaders	25	27	24	15
Workers	3	2	2	7
No one party at fault	26	18	14	8
No Opinion	32	40	42	45

Responses According to Customer Groupings

RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
The Government	6	3	6	5	11	1	17
The Company	10	16	6	12	15	..	17
Labor Leaders	23	23	20	12	21	27	50
Workers	1	5	2	2	2	2	..
No one party is at fault	24	14	20	17	11	16	..
No Opinion	36	39	46	52	40	54	16

COMMENTS

Electric workers should not strike. However, they must have some recourse for fair wage and working conditions. Government should run the company in the event of a strike. Wages should be adjusted to cost of living.

●

I believe strikes are necessary only when working conditions are intolerable and employer refuses to improve but I don't approve of power strikes that affect health, safety and livelihood of general public.

●

Believe unions have same duty to perform as corporations and should be regulated as such. I feel any man has right to strike or arbitrate where working conditions are not satisfactory.

●

In competitive fields, we have not reached a point where strikes should be ruled out. In public fields, where charters give the company exclusive rights to serve the public, the public has a right to expect uninterrupted service.

●

Do not believe strikes would cause rates to go up high enough to hurt anyone.

●

Electric company should be smart enough to prevent strikes—and they sure have money enough.

Public utilities should never be permitted to strike.

●

Company could raise rates and give the workers a raise but PUC has their hands tied.

●

Electric company could give raises in wages without raising rates.

●

Everyone has a right to justice of some kind. And I believe anyone should be permitted to strike until the cause is eliminated. Strikes are the only defense workers have.

●

The leaders of the electric union should be more tolerant of the company position.

●

Service on which public safety depends should be controlled like other monopolies. It is completely out of the company hands to pay increase if rates are held down by public utility commission.

●

No matter how inconvenienced I should be, I would make any sacrifice so the workers could get their rights. The general public ought to help the working men get better working conditions.

The light company employees have dangerous work to do, and they deserve a good wage.

●

Company should give wage increase from excess profits.

●

Arbitration is the only method.—About 40 persons made similar statements.

●

The government could eliminate the electric strikes by setting a wage and hour standard.

●

A strike in utility equals the same in my opinion as starving our children or refusing a doctor's aid.

●

Proper legislation should be passed to provide constant supply of all utilities to all persons.

●

Government should take over power plants only as last recourse to avoid public suffering. Union members should accept responsibilities, and not follow organizers' ideas like sheep to slaughter. I am opposed to C.I.O. methods.

●

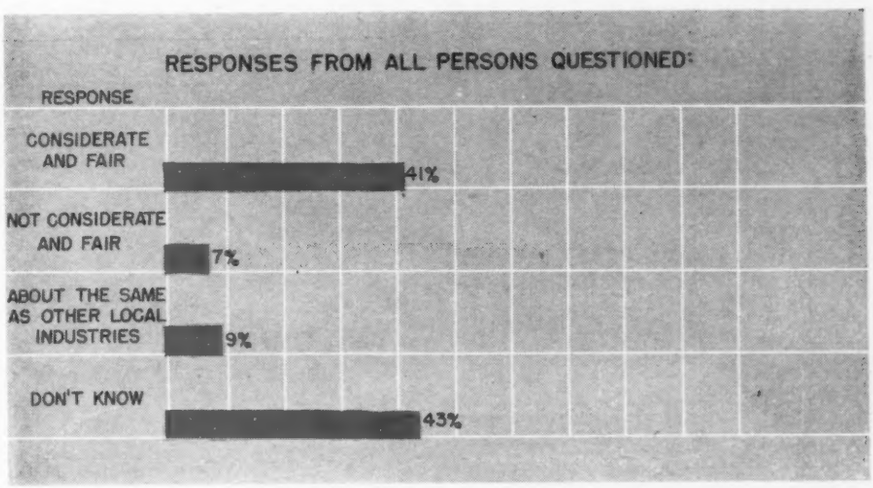
Operation of a light company should never stop. Company is too tyrannical, dictatorial.

Treatment of Workers

Generally speaking, would you say that the electric utility is or is not considerate and fair in dealings with its employees?

FOR EVERY 1 person who thinks that the electric utility is not considerate and fair in dealings with employees, there are 6 who think it is. One other thinks the condition is about the same as in other industries and 6 more have no opinion. Thus, out of 14 people, there is only 1 who feels definitely that electric utility employees are not treated considerately and fairly. This is the conclusion from all responses to the question on this page.

Several departures from the general opinion are to be noted in the various breakdowns of responses. Among people of below-average economic status the ratio of "yes" to "no" replies on this question is only a little more than 2 to 1 while in the general opinion it is 6 to 1. Also, among union members the "yes" to "no" ratio is less than 3 to 1, while the non-union opinion, 6 to 1, is the same as the over-all ratio. And it may be worthy of note that a large proportion of those who believe electric utility workers should be permitted to strike believe also that the workers are not treated with consideration and fairness.



Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES	NO	DEPENDS	NO OPINION
	PERCENT	PERCENT	PERCENT	PERCENT
Considerate and fair	33	49	39	19
Not considerate and fair	13	5	6	4
About same as other local industries	6	9	14	7
Don't know	48	37	41	70

Responses according to economic groupings

RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
Considerate and fair	47	49	43	29
Not considerate and fair	8	5	6	12
About the same as other industry	10	7	11	8
Don't know	35	39	40	51

Responses According To Union Membership Or Not

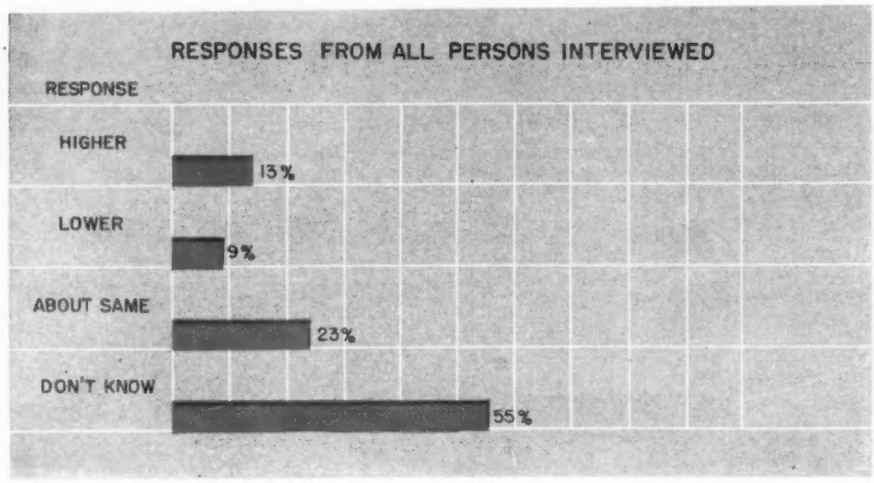
RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
Considerate and fair	33	42
Not considerate and fair	12	7
About the same as other industries	9	9
Don't know	46	42

Responses According To Customer Groupings

RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Considerate and fair	50	36	46	57	46	39	57
Not considerate and fair	7	8	5	5	9	2	13
About the same as other local industries	8	9	8	8	8	16	6
Don't know	35	47	41	30	37	43	25

Wages in Comparison

In your opinion, are the wages of workers in electric utilities, higher, lower, or about the same as wages of workers in factories?



IN REGARD to replies to the question concerning wages of electric utility employees, it may perhaps be assumed that those who said they think utility wages were about the same as in factories, were, in fact, saying in different words that they do not know. On this assumption, it can be concluded that only 22 percent of persons interviewed have definite opinions in the matter. And of those with definite opinions, more than half think that utility wages are higher; highest ratio is among farmers, nearly 90 percent.

That proportion of half or better of definite opinions that wages in utility are higher than in factory employment, holds for all groups and classifications of responses except 2. The exceptions are the opinions of union members who believe, 17 to 12, that utility wages are lower and of those who think utility workers should be permitted to strike. These latter are of opinion, 13 to 12, that the factory worker gets more money than the utility employee.

Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES	NO	DEPENDS	NO OPINION
	PERCENT	PERCENT	PERCENT	PERCENT
Higher	12	13	13	9
Lower	13	7	11	3
About same	18	27	23	17
Don't know	57	53	53	71

Responses According To Economic Groupings

RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
Higher	14	14	10	13
Lower	9	9	10	11
About the same	21	24	25	20
Don't know	56	53	55	56

Responses According To Union Membership Or Not

RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
Higher	12	12
Lower	17	9
About the same	21	23
Don't know	50	56

Responses According To Customer Groupings

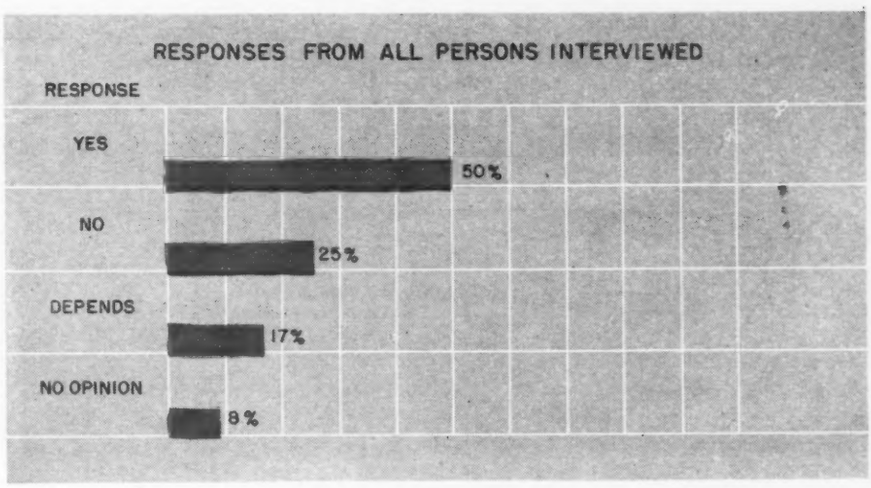
RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Higher	20	10	16	19	15	9	19
Lower	14	10	7	9	9	2	6
About the same	22	22	30	19	21	30	31
Don't know	44	58	47	53	55	59	44

Employment Benefits

If electric utility workers enjoy such benefits as steady year-round employment, security, vacations, and pensions, are they justified in demanding the wage increase that is being granted workers in other industries?

STRIKING EVIDENCE of growing belief that workers are entitled to steady and secure employment, to vacations, and to pensions in old age, is contained in the replies to this question. The idea that these things were benefits that made employment in one firm or industry more desirable than in another is giving way to the belief that they are rights of the worker which should be recognized in any employment.

This is the only explanation of the fact that 2 out of 4 persons interviewed think, and only 1 out of 4 do not think, that despite these benefits of electric utility employment the workers are justified in demanding wage increases equal to those being granted in other industries. As was to be expected, union members and those who believe that electric utility workers should be permitted to strike show a higher ratio of opinion that such demands are justified. Lowest ratios of such opinion appear in the responses of prosperous folk and of city officials.



Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES	NO	DEPENDS	NO OPINION
	PERCENT	PERCENT	PERCENT	PERCENT
Yes	62	45	45	45
No	18	31	21	13
Depends	14	16	28	9
No Opinion	6	8	6	33

Responses According To Union Membership Or Not

RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
Yes	59	49
No	18	26
Depends	17	17
No Opinion	6	8

Responses According To Economic Groupings

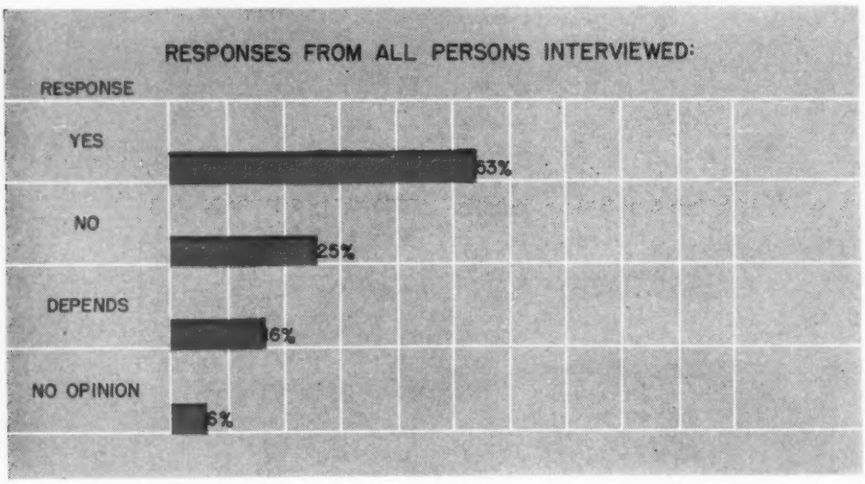
RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
Yes	43	47	55	49
No	30	26	24	23
Depends	21	21	14	17
No Opinion	6	6	7	11

Responses According To Customer Groupings

RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
Yes	49	51	46	44	52	50	75
No	27	24	31	22	24	20	19
Depends	18	16	19	28	17	16	..
No Opinion	6	9	4	6	7	14	6

Higher Bills

If it would mean you personally would pay a bigger electric bill, would you be willing to let the electric utility workers have the increase that's now being given workers in other industries?



MORE than half the people interviewed said they would be willing to pay a higher electric bill in order to give utility workers a wage increase, as is being done in other industries. Only one quarter of them said definitely they would not be willing to pay a higher bill.

Among residential customers, the "Homes" column in the tabulation according to customer groupings, the idea of paying a higher bill met with less enthusiasm than among other identified customer classes. Neither did the customer of below-average economic status like the prospect as well as the more fortunate. Analysis of responses according to union membership or not shows that union members are more numerously willing to pay more than are people without union affiliation. And more of those who believe electric utility workers should be permitted to strike are willing to pay higher bills than is the case among those who do not believe such strikes should be permitted.

Responses according to replies to question, "Do you believe electric utility workers should be permitted to strike?"

RESPONSE	YES PERCENT	NO PERCENT	DEPENDS PERCENT	NO OPINION PERCENT
Yes	60	51	50	36
No	22	27	23	19
Depends	14	16	23	17
No Opinion	4	6	4	28

Responses According To Economic Groupings

RESPONSE	PROSPEROUS PERCENT	AVERAGE PLUS PERCENT	AVERAGE PERCENT	BELOW AVERAGE PERCENT
Yes	52	55	57	46
No	24	23	26	27
Depends	22	16	15	16
No Opinion	3	5	2	11

Responses According To Union Membership Or Not

RESPONSE	UNION PERCENT	NON-UNION PERCENT
Yes	59	52
No	23	25
Depends	13	17
No Opinion	5	6

Responses According To Customer Groupings

RESPONSE	OFFICES PERCENT	HOMES PERCENT	FACTORIES PERCENT	CITY PERCENT	STORES PERCENT	FARMS PERCENT	UNIDENTIFIED PERCENT
Yes	60	47	62	62	61	59	44
No	19	29	18	12	21	17	38
Depends	18	16	16	23	16	16	12
No Opinion	3	8	4	3	2	8	6

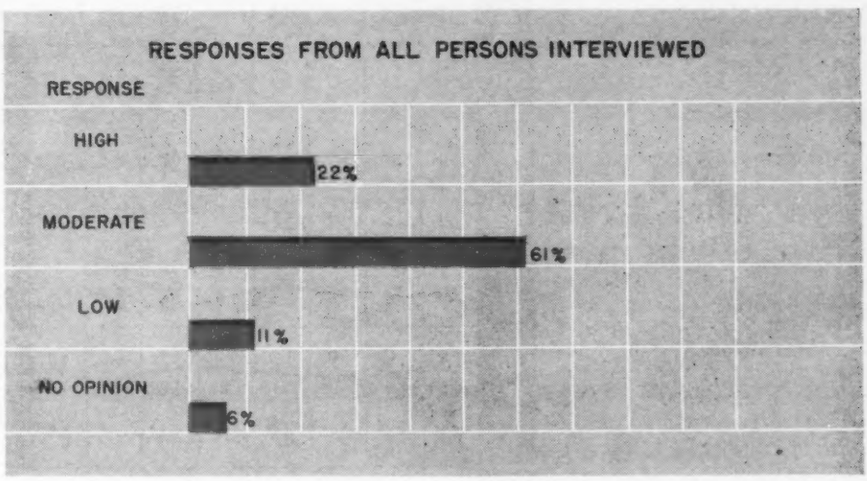
Price of Electricity

Is it your impression that the cost of electricity is high, moderate or low?

LESS than one quarter, 22 percent, of all persons interviewed think that the cost of electricity to them is high. That the cost is moderate is the belief of 61 percent and 6 percent have no opinion. This leaves 11 percent who think they pay a low price for electricity.

A smaller proportion of city officials think the cost of electricity is high and more of them think it is low than in any other customer grouping. Except for "Unidentified" the largest proportion of opinion that the cost is high is among residential customers.

In the tabulation of responses according to economic groupings fewer people in average-plus circumstances think the cost is high than in the prosperous group. Among union members fewer people think the cost is low or moderate than among folks of non-union affiliation. Those who think electric utility employees should be permitted to strike are more inclined to believe that electricity cost is high than are those who do not think such strikes should be permitted.



Responses according to replies to question, "Do you believe electric utility employees should be permitted to strike?"

RESPONSE	YES	NO	DEPENDS	NO OPINION
	PERCENT	PERCENT	PERCENT	PERCENT
High	25	21	21	20
Moderate	55	63	62	56
Low	12	12	13	8
No Opinion	8	4	4	16

Responses According To Union Membership Or Not

RESPONSE	UNION	NON-UNION
	PERCENT	PERCENT
High	25	22
Moderate	58	61
Low	11	11
No Opinion	6	6

Responses According To Economic Groupings

RESPONSE	PROSPEROUS	AVERAGE PLUS	AVERAGE	BELOW AVERAGE
	PERCENT	PERCENT	PERCENT	PERCENT
High	21	17	23	26
Moderate	58	61	61	61
Low	16	16	11	8
No Opinion	5	6	5	5

Responses According to Customer Groupings

RESPONSE	OFFICES	HOMES	FACTORIES	CITY	STORES	FARMS	UNIDENTIFIED
	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT	PERCENT
High	21	23	21	14	22	22	25
Moderate	57	63	51	60	57	60	63
Low	17	9	20	21	12	12	12
No Opinion	5	5	8	5	9	6	..

SUMMARY

of Responses According to Utilities
in whose Service Areas Survey Was Conducted.

Question		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Should utility workers be permitted to strike?	NO	53	28	48	48	40	62	51	48	45	38	44	62	47	43	77	53
	YES	28	38	31	31	40	16	26	16	18	38	37	24	24	22	9	31
Should utility strikes be arbitrated?	YES	94	85	94	98	88	83	93	91	97	93	93	98	97	100	100	100
	NO	1	4	1	1	3	5	1	0	0	5	2	0	0	0	0	0
Should government operate struck utility?	YES	81	64	77	59	64	79	80	77	79	80	81	71	76	90	100	68
	NO	10	11	9	32	15	11	14	11	9	13	14	19	15	5	0	21
Will cooling-off and fact finding prevent strikes?	YES	58	57	77	72	52	67	73	63	83	77	70	52	79	90	100	84
	NO	28	14	7	17	22	8	4	10	3	17	7	24	3	5	0	11
Punish utility for labor contract violation?	YES	71	74	76	85	72	63	82	66	75	75	67	85	74	78	88	74
	NO	14	9	9	10	13	13	4	14	13	16	18	5	9	9	18	11
Punish union for labor contract violation?	YES	78	79	81	87	74	74	83	82	84	79	68	86	82	100	91	74
	NO	9	6	3	8	9	8	4	5	6	14	14	7	3	0	0	11
Is utility considerate and fair with employees?	YES	46	25	59	37	44	41	12	42	53	39	37	48	44	48	68	58
	NO	6	5	2	31	2	11	10	3	1	5	12	7	0	13	0	0
Are utility wages higher than in manufacturing?	NO	29	28	34	59	21	28	40	30	17	21	35	33	21	40	82	21
	YES	13	13	14	10	16	12	4	8	28	9	2	7	21	18	4	26
Are factory wage increases justified for utility workers enjoying other benefits?	YES	48	44	46	39	73	52	58	48	34	74	67	57	38	30	59	43
	NO	30	17	31	43	10	22	9	27	50	16	12	19	41	48	14	26
Willing to pay higher light bill to cover higher wages?	YES	55	50	47	43	65	69	67	43	38	59	50	64	53	48	28	79
	NO	29	16	31	37	17	11	8	30	28	35	18	19	32	35	4	16
Is price of electricity high?	NO	63	74	70	69	69	76	81	75	75	74	84	65	79	76	95	95
	YES	28	17	28	27	25	13	15	24	20	21	11	33	21	9	0	5

UTILITY UNIONS and memberships

UNIONS which represent substantial numbers of electric utility employees are:

1. The International Brotherhood of Electrical Workers, a semi-industrial union affiliated with the American Federation of Labor.
2. The Utility Workers Union of America, an industrial union affiliated with the Congress of industrial organizations.
3. The International Union of Operating Engineers, a craft union affiliated with the American Federation of Labor.
4. District 50 of the United Mine Workers of America, an industrial union affiliated with the American Federation of Labor.
5. A group of independent unions, generally industrial in character, not now affiliated with any national labor organization.

Reported numbers of locals and memberships of these unions are as shown in the table.

UNION	CONTRACTS	LOCAL UNIONS	WORKERS
IBEW-AFL	368	529	90,000
UWUA-CIO	37	95	45,000
IUOE-AFL*	36	36	7,565
Distr. 50 UMWA-AFL	Not avail.	Not avail.	Not avail.
Independents.	——	about 20	16,000

*Operators and assistants only.

Latest union to enter the electric utility field is the Utility Workers Union of America-CIO, which was organized last summer out of the old Utility Workers Organizing Committee and which held its constitutional convention last month.

With a membership of 45,000, the biggest single block being employees of New York's Consolidated Edison Co. which were led some time ago into the CIO from independent union status by Joseph A. Fisher, organizer of the New York employees and president of the UWUA, the new union is relying on the physical and financial support of the CIO to drive its membership up to 100,000 or more utility workers.

True to the past practice of CIO, which has engaged extensively in political action and concerned itself with far more than the traditional trade union goals of wages, hours and working conditions, the UWUA committed itself to a broad program. In its program is to be found support for the election or appointment of labor people to state regulatory commissions, opposition to war-born industry practices which reduce jobs, and opposition to job evaluation and classification plans, the subject of which is felt to be a matter for collective bargaining. The union will attempt to achieve standardization of wages and working conditions on the basis that tasks are essentially the same.

National officers of the new union would have appreciable control over strikes by local unions, for approval of the national group would be required before a strike call, as well as approval by a majority of the local membership. Under the new constitution, the UWUA president or his agent would be required to attempt settlement of the issue before a strike might be called.

This and other convention proceedings indicate that UWUA is cognizant of the growing public disapproval of electric power strikes.

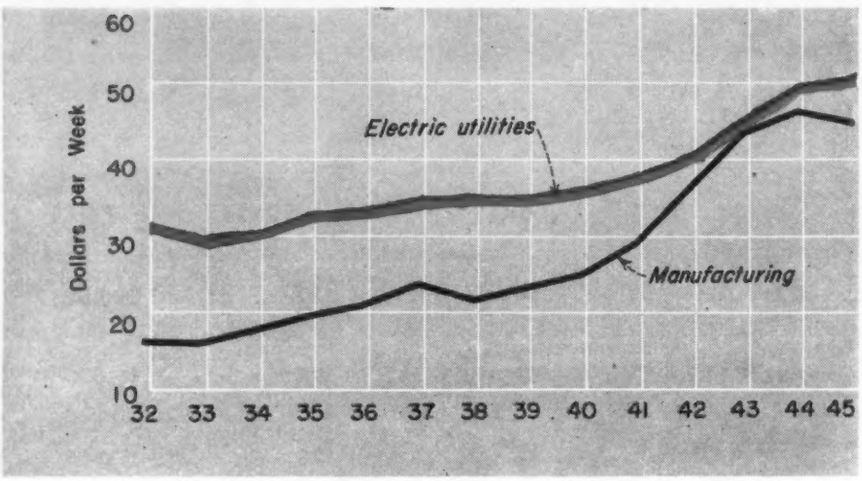
Labor contracts with utility companies would be between the national union and the company, on behalf of the local union, a constitutional provision. Supervisors, except those with authority to hire and fire, would be eligible for membership.

The convention approved a resolution calling for uniform contract termination dates, a device of considerable potential bargaining strength where adjoining systems are under contract with UWUA and are interconnected.

Unionization of foremen has received great impetus this year through decisions of the National Labor Relations Board.

The trend in electric utilities is still obscure. The AFL International Brotherhood of Electrical Workers has long accepted foremen into membership, and there are some independent foremen's unions in utilities. The CIO has yet to establish a foothold among foremen although it has a foreman's union chartered in the Pacific Gas & Electric Co. and another organized but not chartered at Detroit Edison. Consolidated Edison foremen are planning a third.

UTILITY PAY 20 percent above average of manufacturing industries



IN FEBRUARY this year the average electric utility worker took home $50.63 a week, $10.03 more than did the average wage earner in the manufacturing industries. In only one industry group, "Products of Petroleum and Coal," were February, 1946, weekly earnings ($52.95) higher than those paid by the electric utilities.

The accompanying table shows the manufacturing industries by groups only. In the complete tabulation put out by the Bureau of Labor Statistics there are 134 industries listed under the various group headings. In only 12 of the 134 industries did the av-

Take-Home Wages, Hours of Work, and Hourly Earnings

Industry Group or Industry	Average Weekly Earnings Dollars			Average Weekly Hours			Average Hourly Earnings Cents		
	February 1946	Year 1945	Year 1944	February 1946	Year 1945	Year 1944	February 1946	Year 1945	Year 1944
All Manufacturing	40.60	44.41	46.08	40.5	43.4	45.2	100.2	102.3	101.9
All Durable Goods	42.60	49.07	52.07	40.1	44.1	46.6	106.4	111.1	111.7
All Non-Durable Goods	39.02	38.30	37.12	40.9	42.4	43.1	95.3	90.5	86.1
Durable Goods									
Iron and Steel and Their Products	43.12	49.10	50.63	39.6	44.6	46.8	108.9	110.0	108.2
Electrical Machinery	41.49	46.45	47.76	40.4	44.1	46.4	102.8	105.3	102.9
Machinery, except Electrical	47.71	52.24	54.63	45.8	45.8	48.7	114.3	114.0	112.3
Transportation Equipment except Automobiles	47.66	56.10	60.28	38.7	43.7	47.3	123.3	128.3	127.4
Automobiles	42.46	51.99	57.82	34.1	41.3	45.5	124.6	125.6	127.0
Non-Ferrous Metals and Their Products	47.28	48.28	49.16	43.2	45.2	46.8	109.4	106.8	105.0
Lumber and Timber Basic Products	33.54	33.80	34.19	40.1	42.0	43.2	83.6	80.4	79.1
Furniture and Finished Lumber Products	36.83	36.68	36.05	42.3	43.3	44.2	87.1	84.7	81.5
Stone, Clay, and Glass Products	39.40	40.00	39.07	40.7	43.1	43.6	96.7	92.9	89.7
Non-Durable Goods									
Textile Mill Products and other Fiber Manufactures	33.77	31.09	29.63	40.5	41.1	41.9	83.3	75.7	70.8
Apparel and other Finished Textile Products	33.65	31.67	30.33	36.5	36.9	38.0	92.2	85.8	79.7
Leather and Leather Products	36.77	35.05	33.07	40.4	41.1	41.3	90.9	85.3	80.1
Food	40.95	39.51	38.48	44.3	44.9	45.4	92.5	88.0	84.9
Tobacco Manufactures	32.04	31.79	29.94	38.4	41.7	42.4	83.3	76.4	70.6
Paper and Allied Products	41.30	40.50	38.95	44.0	45.9	46.0	94.0	88.3	84.6
Printing, Publishing and Allied Industries	49.61	47.22	44.13	40.8	41.4	41.0	121.6	113.9	107.6
Chemicals and Allied Products	42.62	44.00	43.58	41.7	44.5	45.7	102.1	98.9	95.3
Products of Petroleum and Coal	52.95	55.87	55.19	41.4	46.2	46.7	127.9	121.0	118.1
Rubber Products	45.85	49.54	49.80	40.6	44.0	45.5	112.9	112.5	109.5
Miscellaneous Industries	41.29	43.11	43.79	41.8	44.0	54.8	98.8	98.0	95.7
Non-Manufacturing Industries									
Telephone	44.37	*	38.39	40.7	*	42.3	109.5	*	91.1
Electric Light and Power	50.63	50.05	48.04	42.4	43.5	43.1	119.5	114.1	110.7
Street Railways and Buses	50.71	50.50	47.64	49.5	51.4	50.4	101.3	97.4	93.3
Anthracite Coal	56.85	48.98	47.93	41.2	39.2	40.7	137.6	125.2	117.8
Bituminous Coal	57.18	52.25	51.27	45.0	42.3	43.4	127.0	124.0	118.6
Metal Mining	37.83	45.86	44.55	35.8	44.0	44.2	105.5	104.2	100.7
Petroleum Products	52.45	54.24	53.27	40.5	45.2	45.4	129.0	119.7	115.1
Wholesale Trade	46.07	44.07	42.29	41.9	42.7	42.9	109.5	102.9	98.5
Retail Trade	30.77	28.31	26.58	40.5	40.3	40.3	83.7	77.3	72.4
Brokerage†	72.52	64.48	54.38	*	*	*	*	*	*
Insurance†	50.93	47.13	44.87	*	*	*	*	*	*

*Not available

Source—Bureau of Labor Statistics

†These are not considered in comparison because weekly hours and hourly earnings are not recorded.

erage worker take home higher weekly pay in February than did the electric utility employee.

As for February, 1946, so also is it for the full years 1945 and 1944; average weekly pay in the electric utility industry was higher than the average for all the manufacturing industries. It is significant to observe that the difference between the two was greater in 1945 ($5.64) than in 1944 ($1.96) and still greater in February, 1946 ($10.03). War production was at its height in 1944 and manufacturing employment at its peak, but even then the average utility man made more money than the average factory worker. The reason for these differences, as appears in the table, is partly the higher average hourly rate of the utility man and partly his more continuous employment.

Among the non-manufacturing industries, in which "Electric Light and Power" is classified, the utility man finds his February, 1946, weekly wage topped by workers in 4 other industries, but his hourly rate exceeded by only 3. Here again the table does not completely reproduce the data from the Bureau of Labor Statistics which contain 25 entries. The 13 entries not reproduced all show weekly earnings less than those of electric light and power. In 1945 the workers in only 3 other non-manufacturing industries had higher weekly earnings than utility people and in 1944 only 2 had higher earnings.

Thus in the complete Bureau of Labor Statistics listing of 159 manufacturing and non-manufacturing industries (See note excluding "Brokerage" and "Insurance" at bottom of table.) the weekly wage of the utility worker was exceeded in only 16 other industries in February, 1946. He is not in the top 10 percent, but right next to it and that, considering his much more desirable conditions of employment, looks pretty good.

* * *

GOVERNMENTAL REACTION to Utility Strikes

Legislation enacted and proposed has resulted from public resentment against actual and threatened interruptions of service

NEVER BEFORE has there been so much agitation for legislation to control labor disputes in public utilities. It comes naturally from a people whose daily life has become more and more dependent upon the electricity and gas that feeds into their homes and runs their hospitals, factories and transportation systems.

Legislators in the past gave little thought to controlling disputes between management and labor in public utilities because there was little union organization in this field until recent years. Unionism is young in public utilities, which may account for some of the irresponsibility now prevalent. But it is growing, spreading—and rapidly.

Every day public utilities are the subject of government orders recognizing unions, ordering bargaining unit elections, directing hearings and whatever. A full-fledged CIO union is born in Atlantic City; the older AFL and independent unions must meet the challenge. There is a continuous struggle for union power and prestige, if not for self-preservation. All this means trouble.

What tools has government designed to make for greater labor stability in this vital area of industry?

Nationally, proposals have been advanced in Washington, but they haven't progressed very far. On the other hand, state governments have shown some inclination to face up to the problem. New Jersey passed special legislation only last March. Let's look at the states first.

Only three states—New Jersey, Illinois and Minnesota—appear to have laws designed to minimize strikes against public utility service, although others undoubtedly are considering—and will enact—similar laws. None of them actually ban strikes; they merely require or provide certain procedures to be exhausted before striking or locking out, or, as in New Jersey, permit government seizure of the utility. While Virginia has no special law with respect to utility labor disputes, the governor averted a strike against the Virginia Electric & Power Co. early in April by ordering induction of the workers into the militia for compulsory service in the event of a strike.

The New Jersey law was only nine days old when Gov. Walter E. Edge invoked it to seize nine gas and coke plants of the Public Service Electric & Gas Co. on April 4—only a few hours before six independent unions were to stage a strike of some 1,200 employees over a wage dispute.

Under this law, the governor may seize a utility (1) if its effective operation is threatened or interrupted as a result of either party refusing to accept the recommendations of a "public

hearing panel;" or (2) if, at any time, a strike or lockout occurs which the governor believes "will result in the failure to continue the operation of the public utility, and threatens the public interest, health and welfare."

There are no penalties under the law and no employee is required to work, even after seizure.

Employees are given the right to organize and bargain collectively. Agreements must be for one year. Any proposed changes must be presented to the other party and filed with the State Mediation Board at least 60 days before contract expiration. If no agreement is reached and the dispute is not submitted to arbitration before the contract expiration date, a three-man panel will be established with each party selecting one member and these two selecting the third. The panels are to complete public hearings in 15 days, subject to extension by agreement, and a report and recommendations are to be filed with the governor within five days.

The law declares it to be a state policy that "heat, light, power, sanitation, transportation, communication, and water are life essentials of the people; that the possibility of labor strife in utilities operating under governmental franchise is a threat to the welfare and health of the people; that utilities operating under such franchise are clothed with public interest, and the State's regulation of the labor relations affecting such public utilities is necessary in the public interest."

Illinois and Minnesota

In Illinois the State Board of Arbitration and Conciliation may investigate disputes where mediation has failed and arbitration has been refused if it believes that the dispute will cause public injury or inconvenience with respect to food, fuel, light communications or transportation. The Board's findings are made public, but are not binding. When one of the parties asks the Board to intervene, the application must contain a promise not to strike or lock out for three weeks while awaiting a decision.

Minnesota law requires a 20-day "cooling-off" period in disputes in all industries. In disputes affecting the public interest, which would include public utilities, the governor may appoint a three-man special commission, after which there would be another waiting period of 30 days without strike or lockout.

As to possible legislation in other states, it is known that Gov. Frank J. Lausche of Ohio, who was faced with a threatened strike at the Cincinnati Gas & Electric Co., is examining the New Jersey law. In Virginia, Gov. William M. Tuck plans to have the Virginia Advisory Legislative Council

make a study of possible labor legislation in the utility field. His unusual maneuver in the Virginia Electric & Power situation was not put to a legal test, the strike being averted by an agreement to arbitrate.

Congress was asked to interest itself in labor control legislation a year ago when the "B2H" bill was presented by Senators Ball, Burton and Hatch—two Republicans and a Democrat. It banned strikes and lockouts in public utilities and provided for compulsory arbitration of utility disputes if certain efforts at mediation failed. Both management and unions expressed distaste for compulsory arbitration, and the sponsors, admitting their bill was not perfect, welcomed criticism.

Hearings were never held on this proposal, however, although Senator Ball later tried to incorporate some of its ideas in the Case bill.

President Truman, following his ill-fated Labor-Management Conference, proposed cooling-off periods and fact-finding boards in major disputes, which undoubtedly would have included disputes in electric power plants. His ideas were incorporated in identical bills introduced in the House of Representatives and the Senate.

Approved by the House Labor Committee, the President's bill received harsh treatment in the House Rules Committee, where the drastic Case bill with severe penalties against striking workers was substituted for it without hearings of any sort. This rolled through the House.

The Senate Education and Labor Committee killed the Case measure and recommended a mild law without cooling-off periods, without fact-finding and without any penalties, except for interference with delivery of perishable farm products. It favored establishment of a Federal Mediation Board as an independent agency in the Department of Labor. The Board would conciliate and mediate disputes and encourage voluntary arbitration where the other procedures failed. If arbitration was refused, the Secretary of Labor would be notified of it. There the matter would end as far as the Board was concerned.

Discussing fact-finding as a step in settling utility disputes, the committee stated in its majority report that "fact-finding procedures are peculiarly inapplicable to public utility operations."

"Investigations involving public utility rates are highly technical and have traditionally consumed periods of time extending for years," the committee report continued. "It is doubtful, therefore, that a fact-finding board in the public utilities field could render an expeditious decision, and the tardiness of fact-finding is an almost insuperable obstacle to the success of such techniques for the settlement of disputes."

Fact-Finding Not Effective

"Moreover," the committee concluded on this point, "it should be noted that fact-finding in connection with utilities will have peculiarly little efficacy in mobilizing consumer pressure in support of the fact-finders' conclusions. The inherent monopoly position of the average utility makes consumer pressure of slight significance."

Taking a different view, the committee minority, led by Senator Ball, urged that authority be given the President to create an emergency commission to investigate and report on any unsettled dispute in a public utility which threatens "a substantial interruption of an essential monopolized service." There would be no strikes or lockouts for 30 days, during which the commission met, and for an additional 5 days after its report. This

would be in addition to a 60-day cooling-off period for general disputes, beginning with the date a bargaining conference is first requested by either party to the dispute. The commission's recommendations would be confined to wages, hours and working conditions.

Employers who violated the status quo during the 95-day period would be guilty of an unfair labor practice. Employees who struck during that period would lose their legal status as employees under the Wagner Act, leaving the employer free to reemploy them or not.

"The vital difference between public utilities and other private industry places them in a different category," the report asserted. "Because they usually enjoy a Government-sanctioned monopoly of a service or supply essential to public welfare, and because their rates are fixed and their affairs regulated by governmental agencies, we believe both employers and employees in utility industries have long recognized that they have a special and larger obligation to the public interest and to Government."

The minority members said they believed their proposed amendment properly excludes the emergency commissions from becoming involved "in endless discussion of utility rates required to pay the wage to be recommended." They concluded:

"The general standard for determining what are fair wage rates in any utility industry should be the wage rates prevailing in similar communities for similar work, and it should then be the obligation of the utility to secure from the proper governmental agency any adjustment in its rates required to pay fair wages."

Utility Strikes Exclusively

A bill devoted entirely to strikes in public utilities was introduced in the House last February by Rep. Hoffman of Michigan and referred to the Labor Committee. Embodying some of the penalties contained in the Case bill, it would require a 60-day notice of intention to strike. If a strike continued for 24 hours in violation of the 60-day notice or other contract provision, the strikers would cease to be considered employees. For a period of a year, such strikers would lose any rights under the Wagner Act with respect to the employer struck; the union would not be recognized as a representative of the employees, and the National Labor Relations Board could not require the public utility to bargain with the union as the representative of any of its employees. In the light of other legislation, no action is anticipated on this bill.

Also expected to die is a resolution introduced by Rep. Hand of New Jersey, referred to the Rules Committee, which would direct the Labor Committee to investigate means of preventing strikes in industries necessary to "life and health," including public utilities. It asked further that the committee "give full attention to special compensation, pension rights, and other forms of security to workers in such industries."

Public sentiment seems to be in favor of some controls against utility strikes. A recent Gallup poll showed 60 percent of the people in favor of banning such strikes, 32 percent opposed, and 8 percent undecided. Union members were 40 percent in favor and 52 opposed, 8 percent undecided.

UTILITY UNIONS and the Annual Wage

AMONG the non-immediate goals toward which organized labor is driving, the guaranteed annual wage appears to be becoming increasingly important.

Current study of the guaranteed annual wage stems from its inclusion in the 1943 contract demands of the United Steelworkers of America—CIO. The Wage Labor Board held itself unfitted to decide so broad a question, and the problem wound up under study by an offshoot of the Office of War Mobilization and Reconversion, the Guaranteed Annual Wage Commission, headed by Murray W. Latimer. The Commission has been studying the problem for about two years, with the aid of the Bureau of Labor Statistics, which is to report next month on its findings from analysis of existing and discarded annual wage plans.

Presently, the Commission has listed about nine industries, four of which it proposes to study in greater detail than has yet been possible. Among the nine are "communications and utilities," but it is not yet known whether this group will be included in the four industries which the commission hopes to study in greater detail.

Sentiment among electric utility executives seems to be that the annual wage, not guaranteed, is virtually in effect today in the industry, what with the prevalence of collective bargaining contracts which stipulate that employes shall not lose any wages because of conditions beyond their control which prevent work. One mid-western company has a contract provision that the men are guaranteed half a day's pay five days weekly whether they can work or not, which amounts to a guaranteed 20-hour week. It will attempt to extend this to a guaranteed 40-hour week.

Since one of the major points of attractiveness of utility employment is its continuity, a guaranteed annual wage would not be the tremendous step for electric power companies that it would be for the more seasonal industries.

It is to be noted that the Wages and Hours Act provides that where contracts with unions certified by the National Labor Relations Board provide for either a minimum of 1,040 hours of employment in 6 months, or 2,080 hours of employment in 12 months, no overtime need be paid in excess of 40 hours weekly so long as the total worked does not exceed the number stipulated in the contract.

EDITORIALS

S. B. WILLIAMS, *Editor*

Utility Industry Meetings

WHAT changes come in just one generation! Twenty years ago the electrical industry would be all agog about this time over the coming NELA convention the first week in June when ten thousand or more would travel by Red Special, Blue Special or any other way to Atlantic City or some other place for the annual gathering of the clan. Now the pageantry is gone and instead of a three-ring circus attracting electrical men of all kinds from far and near the annual meeting of the Edison Electric Institute, which will be held week after next, will be a strictly business one-ring affair drawing its attendance mostly from the ranks of power company management.

In fact, it might be said that this June meeting is but one of several EEI annual conventions. The commercial men, the engineers, and the accountants, each have a large annual meeting of their own. This one is for management.

Breaking up the meetings in this way has proven to be very satisfactory in many ways. It has enabled more men to attend the meetings in which they were mostly interested, without leaving entire staffs with few or no top men for a week or more. There is less distraction, less of the holiday spirit.

Even so, too large a part of the personnel of the industry does not get an opportunity to share in this association work. Perhaps a way can be found of increasing participation in the work through regional conferences in areas where a local group is not now functioning in that manner. In those areas where there is a strong state or regional set-up, it will be found that the companies are more alert to new ideas.

Years ago the NELA actually had regional organizations. Right now, however, much can be accomplished by annual regional conferences much the same as are held by some of the national engineering societies, in order to give those who cannot get to New York or Chicago a chance to participate.

With all the new activities of the EEI and the great upsurge in interest, something of this nature might well be tried, so if men can't get to the national meetings, the material will be brought to them and they can be made to feel they are a part of an industry.

Public Admiration for Rate Cuts

OF all years to cut rates, when all costs are shooting skyward and the future holds little promise for any reversal! Nevertheless, if the first five months are any indication the year 1946 will go down in history as holding the record for aggregate of rate reductions.

These reductions are not easy to take in the face of higher operating costs, but if rightly handled they can be made to pay good public relations dividends. Earlier this month when the Florida Power & Light Co. announced a substantial rate cut and also a large construction program, it gave as the reason its belief that it could make out all right by higher volume of sales and lower generating costs.

A local newspaper was quick to compliment the company for seeking financial reward through the well established American way of more output at lower price, instead of taking the easier road, so popular today, of higher prices. The public of Miami, as a result, receives this rate cut with admiration for a company that has so much courage. If public relations have any value that can be measured in dollars it is doubtful if the rate cut was too high a price to pay for the good will that is gained.

However, good will does not automatically follow a rate cut even at this time. There must be more of such intelligent handling as the Florida company has given to its announcement of lowered price for electricity.

Local Load Research

ONE of the more interesting developments of the post-war period is cooperative research on the part of utilities in an area. Rural electrification research is going forward at Purdue and Wisconsin under the sponsorship of utilities of those states. Members of the Southeastern Electric Exchange are financing through Southern Research Institute at Alabama a thorough study of the heat pump and just last week a number of New York utilities joined with some manufacturers to sponsor a study at Cornell of frozen food equipment and operation.

If it is not possible to have a national research institute for load behavior research and equipment performance study, much of the same results can be secured by a number of state projects financed by the local utilities. Perhaps what such a program lacks in national direction is more than compensated for by the multiplicity of projects going on simultaneously, that is if companies in enough states or geographic areas will take their share of the

load and responsibility. And, moreover, it is only fair that they should if they expect to share, as they will, in the information disclosed in the research others are sponsoring.

It isn't necessary that every project be different. Sometimes it is a good idea for the same study to be made independently in different places, in order to check results and eliminate possibilities of error.

Load building for tomorrow is going to be big business. Since money must be spent in large amounts, it is advisable that it be spent where it will do the most good. And that requires some knowledge of the behavior of the load, knowledge that is based on research. In the heavy individual loads, the industry has the answer, but in the smaller loads, that in the aggregate are large and take a lot of money to sell and to serve, performance has not been as carefully studied.

Particularly is it worth-while to study new loads such as the heat pump, farm, food freezing, because it might be possible to go way off the track with insufficient or poor information. At the same time, there are some older loads, and particularly the oldest of all, lighting, which could profitably stand a lot of investigation.

Objectives May Win Right to Distribute Government Power

ONE answer to the moot question of the day concerning the right to distribute government-generated power was given recently by the chairman of the Federal Power Commission, Leland Olds, in an address before the American Public Power Association, when he said, in effect, that the business will go to the systems that adopt rate policies that have as their objective greatly increased consumption.

While the disposition of government-generated electricity is under the jurisdiction of the Department of Interior and not the Federal Power Commission, the thinking of the heads of these two agencies on this matter is probably in fairly close accord. Regional development is held by them to be an essential feature in each of these major federal projects. Regardless of all the hullabaloo about navigation, flood control, soil erosion—the thing that really gets the votes is the promise of cheap power and all that people think it implies.

While it is true that government projects enjoy certain cost advantages, such as taxes, allocated costs and low financing charges, history has shown that they have not been able greatly to undersell well managed aggressive private companies. In fact, there cannot be any appreciable difference in rates that will attract large usage.

The difference then is in the objectives. In addition to passing on to the customers any cost benefits received as the result of purchasing government power wholesale, power companies must visualize the quick absorption of that power and at rates that will make it possible. This kind of objective has a better chance of winning the right to distribute government power than any other.

There is no question in our mind but what private companies with a goal and a program would give greater assurance of reaching that objective in the time set than any other group because they would have no one to fall back on if they lagged. The incentive motive is undoubtedly the more impelling. Nor is there any doubt in our mind but what private companies can set large objectives and reach them. They have done it in the past, and some are doing it now.

The Promise of Modern Science

FOR two days last week in Pittsburgh to mark the centennial of the birth of George Westinghouse, outstanding scientists, engineers and educators discussed, in a series of brilliant symposiums, the things that are going on today in science, their meaning to mankind and their impact upon world civilization. It would be difficult to imagine a more fitting tribute to the memory of one of America's great technical and industrial geniuses than this narration of man's invasion of nature's treasurehouses by those who contributed so greatly in the conquest.

Because of the stupendous import of the revelations of these men of modern science one could not help wondering if the world of today will be as wise as that of the generation of Westinghouse, Bell and Edison in harnessing scientific discoveries to the advancement of civilization and the happiness of mankind. Three generations ago we were embarking on the golden age of science when darkness gave way to light, when voice was freed of the shackles of distances, when human toil was eased by power —an age when man, emancipated from drudgery, began to live in the luxury of his dreams. By destroying the barriers that limited an individual's endeavors new frontiers of opportunity were opened and he enjoyed greater freedom than ever before.

The age which the scientists are now opening to us is no less golden, but is it the gold of Westinghouse, Bell and Edison, or is it the gold of Midas? Will it produce greater happiness or greater tragedy? Will it bring more freedom as has greater knowledge in the past, or more authoritarianism in government because of the national defense angle?

After exploration of the social as well as the scientific aspects of these problems, the speakers at the forum were not only optimistic but enthusiastic about the benefits that would come from modern research, not only to the individual but to government as well.

To the Westinghouse Educational Foundation for serving such a rich intellectual feast goes not only the appreciation of those who were privileged to attend, but of thousands of others who, through the published papers, will get a perspective not only of the accomplishments of modern science but the assurance of a better world—a world freer from aggression and depression.

WASHINGTON COMMENT

By R. N. LARKIN Washington Correspondent

Setback for Public Power in Pending Appropriation Bill

UNTIL the Interior Appropriation Bill for 1947 has been signed by the President, it will be hard to ascertain the true proportions of the setback which public power has suffered in Congress. To call it more than a setback will be dangerous.

Before it reaches the President, the bill must go to a Senate committee, the Senate floor, return to the House, go before a conference committee and return to the House and Senate as often as may be necessary to resolve all disagreement. In the tortured course it must yet pursue, a lot can, and in all probability will, happen to the bill.

Heavy Cuts in Committee

Headed by Rep. Jed Johnson, Oklahoma Democrat, who has long swung the hatchet on Interior appropriation bills, the House committe chopped $172,113,251 from the bill as recommended by the President and his bugget bureau. A substantial portion of this cut came in proposals for federal power development. Three agencies, the Bonneville Power Administration, the Southwestern Power Administration, and the Reclamation Bureau, suffered cuts totalling about $125,000,000. Some of the Reclamation cuts were against Reclamation proper. Many of them were against Reclamation power development. However much the Senate may restore and the House conferees accept, by no means all of the House cuts will be restored. Thus, it becomes apparent that Interior's power planners have suffered some measure of a setback.

To precisely what causes the setback may be attributed is not readily ascertainable, but a large portion of the privately owned electric power industry will undoubtedly be endeavoring to make some sense if it can out of the tangle.

Beyond any doubt, the extent of the setback, whatever it finally totals in dollars slashed off the budget recommendations, will not be wholly unexpected. It would be ridiculous to believe that Interior pared its requests to the bone before presenting them. Interior knew that Johnson would head the subcommittee studying the bill and it knew his reputation. It knew of the existence, if not the extent, of a desire for economy on the part of many legislators. It asked the astronomical total of $346,765,830. What it would have been happy to settle for is not known, but to the extent that the two figures differ, and to the extent that the difference concerns power, no reversal has been inflicted or suffered.

The decision as to how much of the House action was due to a real desire for economy and how much was due to a real upsurge against federal public power is obscure, but the chances are that the economy motive vastly outweighed any "preserve-private-ownership" motive.

Probably Not a Victory

Relatively few attempts were made on the House floor to reinstate cuts in budget recommendations. And few of these attempts concerned power items. The most important power item which was sought to be raised was raised—in the amount asked by the sponsor of the amendment. Why it was not raised further is an interesting question. If one could be sure that Speaker Sam Rayburn asked only $7,500,000 for the Southwestern Power Administration solely because that is the best he thought he could do—and not because he wanted to avoid too much of a House fight while awaiting the action of Senatorial friends—private power might figure it won a victory. The chances are, however, that Rayburn was merely jacking up the floor under the item while awaiting Senate action to put a lofty roof over it, a device which would increase the leverage of SPA's friends on the conference committee.

The overpowering way the managers of the bill beat off attempts by westerners to reinstate funds chopped from their pet projects can only be indicative of the economy motive. Westerners believe in Reclamation and want all the money they can get for it. Furthermore, it is an election year, when money spent at home in the district is spent most effectively for those who win it. That their eastern fellows refused so adamantly to go along seems to make sense only if it be granted that those representatives who opposed the funds wanted to take home election-year records of economy.

Nicely Under the Tent

Obviously, the opposition to power features of the bill which was raised by the National Association of Electric Companies and by other private power people must be considered in any attempt to evaluate the causes for the action thus far. The SPA item was widely heralded as the sticking point. The bulk of the opposition testimony on power which was given to the Johnson subcommittee concerned SPA. Yet the only important vote which dealt solely with power was in the nature of a reversal for private power, for it added $4,302,000 to a public power item. Of course, wishful thinkers or those who view with alarm the activities of what they call the power trust might argue that the vote on the SPA item increase was a private power victory since it stopped short of restoring the entire $20,000,000 which had been chopped. Such a contention, however, would appear to be as pointless as that which was made in some places when the committee report was issued, that the $20,000,000 cut by the committee in the SPA item was a private trust victory.

It is apparent that the absolute minimum which SPA will take back to Tulsa this year is $7,500,000. This gets the camel's nose nicely under the tent. So long as the nose is firmly under the tent, it seems unwise to speak of public power defeats.

NEWS OF THE WEEK

For Security in War More Reserve Capacity Needed

Industrial College of Armed Forces Conducts Seminar and Forms Committee of Power Experts to Consider Problem—Interconnections May Even Weaken Nation in War-Time

THE DAY may not be far distant when the United States will want seriously to consider appropriating public funds to buy power security for war in the same fashion it purchases military security in the form of armies and navies.

This possibility, raised at a seminar on "electric power and industry mobilization" by the Industrial College of the Armed Forces at Washington last week, brought suggestions from executives of two large power systems that some measure of reserve capacity not included in normal rate schedules may be a necessary part of the nation's industrial preparedness.

The seminar is to be followed by organization of a formal committee representing the electric power industry, both public and private, which will consult with the Industrial College on adequate preparation of the industry for any eventuality within the scope of the college. Those invited to attend the seminar and who will become committee members are D. L. Bement, vice-president of the Northern Indiana Public Service Co.; Walker Cisler, chief engineer of power production, Detroit Edison Co.; Merrill DeMerit, chief power engineer, Tennessee Valley Authority; C. H. Giroux, special assistant to the Chief of Engineers; George Grimm, Florida Power Corp.; C. S. Lynch, executive vice-president of the Arkansas Power & Light Co.; Harvey McPhail, chief of the Reclamation Bureau's Power Utilization Section; V. M. Marquis, Pacific Gas & Electric Co.; Clarence W. Mayott, special assistant to the president of the Hartford Electric Light Co.; W. E. Mitchell, president, Georgia Power Co.; J. E. Moore, Ebasco Services, Inc.; William Peterson, chief electrical engineer, Los Angeles Department of Water and Power; B. J. Sickler, chief of the Bonneville Power Administration's Power Utilization Section; D. A. Sullivan, Commonwealth Edison Co.; and Douglas G. Wright, administrator of the Southwestern Power Administration. H. S. Fitch, of the West Penn Power Co., attended the seminar as a visitor and will be invited to join the committee.

One of the principal items of discussion at last week's meeting was the amount of capacity reserves which may reasonably be expected to be available in the event of another defense or war production drive. Those who attended the seminar were little impressed with the value of mobile generating reserves but agreed on the value of interconnections, which several men said had been disturbed only in a relatively small way since the termination of the war.

Mitchell emphasized that system reserve position can not be based on expectations of the conditions which would obtain under a war economy and asserted later that it might be necessary to superimpose something on the traditional concept of maximum service at the lowest possible cost to allow for the retention of what might be called a war reserve. Utilities, he said, have a duty not to expand plant foolishly, but this duty might prove to be directly at variance with proper defense thinking. Peterson asserted that it might be necessary to maintain somewhere outside the rate structure up to 20 percent of normal capacity for reserves.

Both Mitchell, who headed electric power representation on the strategic bombing surveys of Germany and Japan, and Walker Cisler, who headed the Army's utility staff in Germany, agreed that the German concept that the capacity of their interconnected system was "infinite" because of the wide integration was proved erroneous.

Wright suggested that there is little point in asserting the economies of system integration unless the savings are actually realized, which led Brig. Gen. Donald Armstrong, commandant of the college, to assert that if interconnection were widely followed, the country would be in worse shape in ten years than it was for the past war.

The Office of War Utilities came in for praise as the best way of handling war power problems. Several system executives agreed that it achieved its purpose with a minimum of controls. Armstrong suggested the organization of a standing committee which would plan controls for any future emergency, asserting that it will be too late to develop controls after the next war starts.

The discussion of bombing power plants indicated the belief that very large stations may not be in the national interest in time of attack. Cisler declared that the largest station in Germany, a 520,000-kw. plant at Goldenberg, was bombed during an attack on another target in October, 1943. In March, 1945, he said, it had only 20,000 kw. in operation. At Berlin, he said, several smaller stations had not been badly hurt. Moore said there are about 50 to 55 plants in this country of 200,000-kw. or more capacity, about half of which are steam and located in populated areas most susceptible to attack.

Mitchell said that the atom-bombings of Hiroshima and Nagasaki had had opposite effects on power systems. At Hiroshima, he said, everything was wiped out. At Nagasaki, some substations at more than half a mile from the aiming point were damaged but remained substantially intact. One plant was not damaged at all, another suffered some damage to its bus structure which would take some time to repair.

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Camp Callan, Calif., System Sold to San Diego Utility

The entire electrical transmission and distribution system of Camp Callan, Calif., including poles, wires, and 92 transformers, was recently sold to the San Diego Gas & Electric Co. as one step in disposal of the camp's 650 buildings and fixtures.

Purchased from the government not long ago by the city of San Diego at a bargain price of $200,000, the sprawling camp is being dismantled for resale to contractors and veterans.

Interior Appropriation Bill Sent to Senate with Amount Requested Halved

Amendments Passed by House to Give SPA $7,500,000 of $23,323,000 Asked—Attempts in Upper Chamber to Increase Public Power Items Expected—BPA Suffers $10,000,000 Cut

THE HOUSE passed and sent to the Senate last week an Interior Department Appropriation Bill which contained only a little more than half the amount that had been recommended for the agency in the fiscal year beginning next July 1, but it boosted from $3,298,000 to $7,500,000 the item allowed for the Southwestern Power Administration which had requested $23,323,000.

Action on the SPA item, which provoked the hottest controversy of any in the bill, came late last week after considerable debate. Two record votes were taken on the amendment, offered by Speaker Sam Rayburn, Texas Democrat, and advocates of the increased appropriation won each handily, 114-88 and 125-76.

As the bill started through the second half of its Congressional gauntlet, it was anticipated that strong attempts would be made before the Senate Appropriations committee and on the Senate floor to boost still further the allowances for the numerous power projects in the bill. Particular emphasis was expected to be paid to the Bonneville Power Administration item, which suffered a $10,000,000 cut, and the Central Valley, Calif., item, which suffered a $15,000,000 cut in the House. No real effort was made in the House to restore either of these cuts, both of which affect major public power projects.

House Efforts Centered on SPA

In the absence of any real fight on either of these items in the House, it was believed that the administration strategy was to concentrate its efforts in the House on saving the highly controversial SPA item, and to await Senate action for any move to restore slashed funds for projects already well established, such as Central Valley and BPA.

SPA officials believe that the $7,500,000 made available by the adoption of the Rayburn amendment will allow them to interconnect Norfork, Denison, and Grand River Dams, presently the only sources of power under control of SPA. As reported by the House appropriations committee, the $3,298,000 would have allowed only some 66-kv. distribution construction around Denison Dam and a 132-kv. transmission line from Denison Dam to Ada, Okla.

With the extra funds, SPA people figure they can build a 132-kv. line from Denison Dam, in northeast Texas, to Ada, Okla., and on to Markham Ferry substation in northeastern Oklahoma, connecting there with the 154-kv. Ark-La line which ties Grand River Dam to the Lake Catherine, Ark., aluminum plant. SPA would purchase a major portion of the 194-mile Ark-La line, extending from Markham Ferry to Nimrod Switch, and then construct a 154-kv. line northeast from Nimrod Switch to Norfork Dam.

Around Denison dam, its 66-kv. feeder construction would extend west to Wilson, Comanche and Walters, Okla., the latter headquarters of a large REA cooperative. From Comanche, it would branch north to Duncan and Marlow, Okla. All these cities have municipal systems, SPA officials said.

If certain restrictive language is eliminated from the House report, SPA people feel, they will be able, under the Rayburn amendment, to build some 66-kv. feeder lines away from Norfork Dam. These would go northeast from Norfork to West Plains, Mo., thence southeast to Thayer, Mo., and northwest from West Plains to Willow Springs, Mo. All cities but Willow Springs have municipal systems. At Willow Springs, an interconnection could be made with the Sho-Me co-op of southern Missouri, one of the larger REA-financed co-ops. REA loads could be served at West Plains and Thayer as well.

As the House passed the measure, it became apparent that the appropriations subcommittee under Rep. Jed Johnson, Oklahoma Democrat, had made an embarrassing mistake in its calculations. Its report authorized the construction of a 132-kv. line from Denison Dam to Ada, Okla., and a substation at Ada, and recommended an appropriation of $500,000 for the item. SPA estimates of the cost to construct this were given to the committee as $509,910 for the 73-mile transmission line and $406,060 for the 45,000-kva. substation at Ada.

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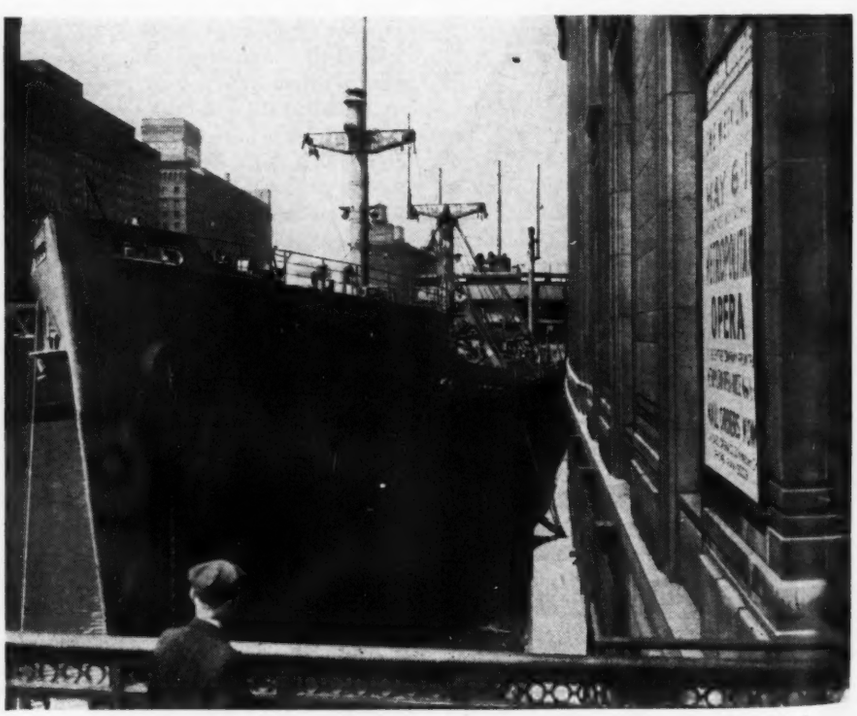
E.E.I. Convention, June 3-5

Atomic power, electric house heating, and extension of rural lines by private utilities are among the more important items on the program for the annual meeting of the Edison Electric Institute, June 3 to 5, at the Waldorf-Astoria Hotel, New York.



ELECTRICITY FOR THE OPERA—When the recent power curtailment in Chicago threatened to force the postponement of performances by the Metropolitan Opera Co., the "Mainsheet Eye" was leased from the Maritime Commission and moored alongside the operahouse to provide the electricity

Home Service Departments Must Take Lead in Satisfying Customers

Southeastern Electric Exchange Sponsored Conference Attracts 200—Manufacturers Suggest Methods of Increasing Sales of Appliances—Saving of Time and Labor Important to Women

HOME SERVICE departments must take a leading part "in making for satisfied customers" if the electrical appliance boom ahead is to be of sustained success, according to views expressed during the two-day Residential and Home Service Conference held in Atlanta last week.

Sponsored by the Southeastern Electric Exchange, the conference attracted more than 200 representatives from utilities and manufacturers. John W. Talley, executive secretary of the Exchange, welcomed the visitors and outlined the strides which have been made in furthering home service programs. Fern Snider, home service director of Georgia Power Co., and chairman of the Exchange's Home Service Section, was in charge of the conference.

Charles A. Collier, vice-president of Georgia Power, declared, "as regards to our home service employees, the direct sale of kilowatt-hours or of all-electric kitchens is of minor importance if they can but sell instead the over-all idea of better living and can inspire the hope of the young people so that they will wish to stay in Georgia instead of migrating to some other section. If they do that, then they will have discharged all the obligation they owe to the company and to their customers as well."

Personal Demonstrators Valuable

J. S. Sutherland, manager, residential and commercial division, Alabama Power Co., urged the expansion of the work of the personal demonstrators so that customers may be taught the proper methods of operation and use of appliances. He saw a breakdown in the bright sales era ahead unless competent home service is maintained.

The customer today wants to know what an appliance means to her and to her family, Elizabeth Woody, director of Consumers Institute of General Electric Co., said in presenting her views on how to help a lady to make up her mind. She advised presenting the time-saving phase of electrical appliances more effectively by translating in terms of specific satisfactions—in terms of what a woman wants.

Margaret Davidson, director of home economics division of Edison General Electric Appliance Co., presented statistics to show that the housewife on the average washes 340 tons of dishes in 30 years, or the average in her lifetime of 72 stacks as high as the Empire State Building. The electric dishwasher, she said, is the answer to eliminating this drudgery.

In demonstrating the latest automatic electric dishwasher and garbage disposal units, Miss Davidson cautioned that before final decision on installation of the disposal unit, an investigation should be made of the local sewage system, the individual septic tank, or cesspool to insure proper operations.

Margurette Reinhart, director of Universal Laboratory for Modern Living, Landers, Frary & Clark, saw expanded markets for pressure cookers and sauce pans because of the growing acceptance of such appliances as time savers. Actual tests, she said, proved time savings of from 18 to 80 percent in preparation of meals.

"Visualize selling" is the keynote for the creation of the electric kitchen, said A. D. Schrader, president of Schrader Minicraft Co. He displayed several miniature kitchens which he offered as a popular selling tool to provide the homemaker with models in planning a new kitchen.

END DISHWASHING DRUDGERY —Margaret Davidson, Edison General Electric Appliance Co., demonstrates how to banish dishwashing drudgery at Home Service Conference at Atlanta. Watching are, left to right, Sara Kelly, South Carolina Power Co.; Mrs. Leo Howard, Savannah Electric Co.; and Ellen Fletcher, Louisana Power & Light

Presenting notes on "Parade of Ideas" for home freeze demonstrations, Margaret E. Bicknell, home economics director, Deepfreeze division of Motor Products Corp., suggested the use of props to illustrate the amount and variety of food which can be stored and the advantages which can be obtained. She advocated the use of colorful posters, film strips, colored lantern slides, movies and posters made in school projects on freezing.

Irving W. Clark, manager, Better Homes Department, Westinghouse Electric Corp., presented at the luncheon meeting the four degrees of electrical living to illustrate the need for adequate wiring as the number of appliances increase in the home.

Others on the program included: Elizabeth Sweeney, *McCall's Magazine;* Karen Flagoes, Kelvinator; Lorine C. Mounce, American Central Manufacturing Corp.; Myrtle Fahsbender, Westinghouse; Ada Bessie Swann, *Woman's Home Companion* magazine; Edwina Nolan, Bendix Home Laundry Institute; Verna Miller, Frigidaire; Mary Webber, General Electric; J. A. Bell, Electromaster; Mrs. Selma M. Andrews, Crosley Corp.; Leota Crays, Westinghouse; and C. L. Osterberger, Louisiana Power & Light Co.

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Senate Studies Legislation to Prevent Utility Strikes

Two additional attempts at special legislation on utility labor disputes were before the Senate this week as it tussled with the problem of anti-strike laws.

Compulsory arbitration is the feature of an amendment introduced by Sen. Alexander Wiley, Wisconsin Republican, which would affect almost any strike of major proportions that could be imagined.

Wiley's amendment to the Case Bill, as reported to the Senate, would provide that when the mediation board established under the bill found that any dispute affecting the health, safety, or security of the nation, the normal functioning of the economy, or any utility whose rates are fixed by government, constitutes a threat of any such disruption, it (the board) would notify the President, who would appoint a seven-man board to conduct compulsory arbitration of the issues. Decision of such board would be final, and the settlement would have to obtain for at least six months.

The board would be empowered to deny any or all bargaining requests; and if its award should provide for a wage

increase, the finding would have to go to the National Stabilization director, who might direct that it be reduced if necessary to conform with the Stabilization Act.

Another amendment aimed at utility strikes in particular was introduced recently by Sen. Allen J. Ellender, Louisiana Democrat. It is based essentially on the same theory as that supporting the amendment on public utility strikes submitted weeks ago by a Republican minority. Ellender's amendment would provide that the mediation board would determine whether any dispute involving a utility whose rates are fixed by government made any substantial threat against commerce. If the board found such a threat to exist, it could ask the President to appoint an emergency committee which would have 30 days to make recommendations. The Republican amendments would do the same, except that they would provide a mandatory 60-day cooling-off period before the committee would function and a mandatory 5-day waiting period after its recommendations were made public before work could be stopped.

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$6,000,000 Construction Plan Announced by Coast Utility

To relieve overloaded transmission and distribution facilities in the industrial areas of Alameda and Contra Costa county, Pacific Gas & Electric Co. will soon initiate a $6,000,000 over-all construction program, with a $3,368,000 substation at Moraga, Calif.

The new station will receive 220,000-volt hydroelectric power from Vaca-Dixon substation for transmission at lesser voltage to distribution substations in the East Bay. Supplying the substation will involve building of a twin-circuit transmission line which, with switching equipment and other improvements at Vaca-Dixon, will cost about $2,747,000.

Now underway near San Leandro and in the Claremont district is $1,583,000 worth of new construction and enlargement of substations.

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Army Plants Leased

Military Chemical Works, Inc., of Kansas City, has leased for five years the Army Ordnance plant at Baxter Springs, Kan., installed in which were four 5,000-kw. condensing steam turbo-generators.

The Lion Oil Co. has leased for five years the Army's Ozark Ordnance Works, at El Dorado, Ark., in which were installed two 1,500-kw. non-condensing steam turbo-generators.

Scientists, Industrialists, Educators Join in Westinghouse Forum

Centennial of Birth of George Westinghouse Observed at Pittsburgh—600 Persons Hear of Scientific Achievements of Past and How They Can Be Used to Better the World

THE 100TH anniversary of the birth of George Westinghouse was observed last week at Pittsburgh where the Westinghouse Educational Foundation conducted a three-day forum.

Before some 600 business and professional men, educators and civic leaders, Gwilym A. Price, president of the Westinghouse Electric Corp., sounded the keynote of the forum when he said in his welcoming speech,

"It is our sincere hope that this forum will help in some way to focus the world's attention on the wealth of scientific discoveries and technological tools at our command. It is our hope that an understanding of the importance of these developments will enable us to see more clearly the rich future that lies before us, if we can somehow get to understand and trust one another as individuals and as nations."

25 Leaders on Program

With this theme to guide them, 25 leaders of American science, industry, and education gave papers and talks which portrayed scientific progress of the last century in many fields and indicated the likely paths on which science will guide the world to a better civilization.

The need for education to further scientific progress was pointed out by Dr. L. W. Chubb, director, Westinghouse Research Laboratories, who advocated solving the present shortage of technical workers by instituting some scheme of locating individuals with an aptitude for scientific or engineering careers and offering them an education and encouragement to continue these careers.

He attributed new scientific developments to three groups or partners in science—the scientist who gets the original idea, the inventor who applies it, and the engineer who designs and processes the invention and makes it available to the world. It was this teamwork which made the American victory possible in the last war as Germany, he claimed, had the three partners, but they didn't work together.

The possibilities of using atomic energy for the generation of power were explained by Dr. Enrico Fermi, professor of physics, University of Chicago. He said that "piles" operated at Hanford for the production of plutonium produce energy in amounts comparable to that of the largest hydroelectric plants but that the energy is delivered at such low temperatures that it is of no practical use. This can be easily remedied if the original use of atomic power and its international complications are subordinated. Then, he said:

"We might conceive that 20 or 30 years from now the general scheme of atomic energy production may be perhaps about as follows. There will be large central installations in which very great amounts of power will be produced and transformed into electrical energy or steam for local power consumption. Besides producing power directly, these large units may also produce some amount of plutonium which will be extracted and distributed to small installations in which plutonium and not uranium will be used as the primary fuel. This plan would have the advantage of permitting wide use of relatively small power units thereby reducing very greatly the difficulties of distribution."

Charles W. Kellogg, president of Edison Electric Institute, in paying tribute to Westinghouse, traced the effect of his inventions on the electric power industry.

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FPC Approves Use of Gas

The Federal Power Commission has authorized the Northern Natural Gas Co. to deliver natural gas to the Iowa Electric Light & Power Co. for use as boiler fuel at the latter's Boone, Iowa, generating plant. The authorization is good for the duration of the coal emergency.

Last fall, FPC declined to authorize the delivery of gas for boiler fuel at the Boone plant on the grounds that adequate coal was available within 100 miles.

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Co-op Men Reject I.B.E.W.

The National Labor Relations Board has dismissed a petition filed by the International Brotherhood of Electrical Workers, A.F.L., after an election in which the employees of the Gibson County Electric Membership Corp. voted 13 to 7 against I.B.E.W. representation.

Utilities Advised to Cooperate to Stop Regulation Becoming Regimentation

Charles C. Wine, Public Service Commission Chairman, Tells Arkansas Utilities Association That There Is Danger In Government Controls Being Retained When not Needed

NEED for the electric and gas industries to maintain their high standards of service while they continue to oppose forces that are seeking to destroy the American system of free enterprise was stressed by speakers at the annual convention of the Arkansas Utilities Association in Hot Springs on May 13 and 14. With an attendance of 526, the convention was the largest ever held by the association.

Charles C. Wine, Little Rock, chairman of the Arkansas Public Service Commission, sounded a warning to the convention delegates in his talk on regulation. He said that unless the industry cooperates wholeheartedly with regulatory bodies, regimentation may replace regulation.

"Effective regulation is entirely dependent upon the cooperation which the regulatory authorities receive from the industry," he said. "The step to regimentation of your industry is not so far that it cannot be accomplished within a relatively short period of time. And you may be sure that step will be taken if and when necessary.

"During the war years our government resorted to many forms of regimentation in your and many other industries as an expedient to meet a more or less temporary emergency. This we all submitted to with some grumbling and bad grace, but the real danger of such regimentation lies in the fact that it may be permitted to continue after the cause—that is, the emergency—has ceased to exist.

Industry Must Cooperate

"The industry itself must recognize its own responsibility in preserving the essential elements of effective regulation. The industry can do so much through the exercise of a real and sincere spirit of cooperation with regulatory agencies in the performance of their duties. Effective rules, regulations and harsh laws are generally brought about by the ill practices and misconduct of some individuals or industries, and such harsh laws, restrictive rules and regulations, when once enacted into laws, are applicable to the good as well as the bad, and likewise, once on the statute books, are seldom repealed, for laws and taxes are said to be somewhat like tax spenders: they seldom die and never quit!"

L. L. Baxter, president, in opening the convention, asserted, "If ever a nation of people needed help, and yet was so coldly prevented by bureaucracy from helping itself, I think that day is today." He charged that "too many people today desire personal and greedy pork-barrel government." He praised the entire utility industry for its outstanding job in the war effort.

Projecting the picture of the national electric industry into the next five years, Edwin Vennard of Chicago, vice president of Middle West Service Co., said that several things will be necessary if companies are to continue to earn a fair return on their investments.

Pooling Should Be Continued

"The ratio of investment to gross revenue should be kept at least as low as in 1945," he said. "Efforts should be made to lower it even further. This will require maintaining high load factors on power systems. The practice of pooling facilities, one company with another, should be continued and expanded so that reserve capacity may be kept at a minimum consistent with good service, and maximum generation may be realized from the most efficient plants. Rate levels should be examined in the light of long term trends and not only in light of earnings in the current year. Rate reductions can not be made to the same extent as in previous years. If current earnings justify reductions in net revenue, consideration should be given to a customer dividend, as distinguished from a rate reduction."

The need for the leaders in the utility industry to use all channels of information to let the American people know what they must do to settle the present national crisis, "with less emphasis on their rights," was stressed by George S. Jones, Jr., vice president of Servel, Inc. "We must do something collectively as business men and women to secure for us the right to continue to operate our business in increasing quality and service to the public, and as a means to that end we must look to our sales departments to use the talents which they have to tell this story adequately," he said.

The need for the electric industry to emphasize the value of its service, rather than the cheapness, was stressed by Ashton B. Collins, creator of Reddy Kilowatt, in his address on "Who's Saving What."

C. L. Leighton, Arkansas division manager of the Southwestern Gas & Electric Co., DeQueen, was elected president, succeeding L. L. Baxter of the Arkansas Western Gas Co., Fayetteville. C. H. Thorpe, superintendent of the Little Rock district, Arkansas-Louisiana Gas Co., was elected first vice president; and Morgan Wright, division manager of the Oklahoma Gas & Electric Co., Fort Smith, second vice president. R. E. Ritchie, vice president of Arkansas Power & Light Co., Little Rock, was reelected secretary-treasurer for the fifteenth term.

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House Ready to Consider Rivers and Harbors Bill

A new Rivers and Harbors Omnibus Bill containing 60-odd projects has been advanced to the House calendar after approval by the Rivers and Harbors Committee.

The bill, which would authorize the projects only, not make appropriations, contains five projects at which power is scheduled to be installed and carries a blanket provision authorizing the installation of penstocks where authorized by the Secretary of War with approval of the Chief of Engineers and the Federal Power Commission.

Power projects in the bill are Foster Creek Dam, on the Columbia River, with an initial installation of 192,000 kw. and an ultimate capacity of 960,000 kw.; four dams on the Apalachicola, Flint, and Chattahoochee and Flint Rivers in Georgia and Florida wherein installations of 7,800, 88,900 and two of 27,000 kw. are to be made; the Arkansas River Basin, including tributaries in Arkansas and Oklahoma, with no specific installations yet described; the Cumberland River and its tributaries in Kentucky and Tennessee, and the Big Sandy, Tug Fork and Levisa Fork Rivers in Virginia, West Virginia and Kentucky, each with undisclosed amounts of power.

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Civic Relations Stressed

The social and economic importance of a sound program of community relations in the areas in which a company is located is stressed in a folder written by Walter Geist, president of the Allis-Chalmers Manufacturing Co. and published by E.M.P.I.C. The folder is the second of a series on all phases of the public relations problem. Copies may be secured from the Electrical Manufacturers Public Information Center, 155 E. 44th St., New York 17, N. Y.

AWARD BANQUET—The banquet at St. Louis on May 14 at which 27 utilities received citations from the Navy and 70 utility men received citations from the Army for their work in the Utilities Wartime Aid Program

23 Utilities Given Awards by Navy for War-time Aid

Twenty-three electric companies in part of the Fifth Naval District were awarded citations by the Navy for their work in the Utilities Wartime Aid Program last week at St. Louis. At the same banquet 70 engineers in the employ of the utilities were given awards by the Army Seventh Service Command for their part in the program.

Rear Admiral William H. Smith, chief of the Department of Plan and Design, Navy Bureau of Yards and Docks, and Maj. Gen. William G. Livesay, commanding general, Army Seventh Service Command, presented the awards and spoke at the banquet.

Utilities honored by the Navy were Black Hills Power & Light Co., Central Kansas Power Co., Empire District Electric Co., Garden City Irrigation & Power Co., Interstate Power Co., Iowa Power & Light Co., Iowa Southern Utilities Co., Kansas City Power & Light Co., Kansas Electric Power Co., Kansas Gas & Electric Co., Kansas Power Co., Kansas Power & Light Co., Minnesota Power & Light Co., Minnesota Utilities Co., Missouri Public Service Co., Missouri Utilities Co., Nebraska Power Co., Northern States Power Co., Northwestern Public Service Co., Saint Joseph Light, Heat & Power Co., Sioux City Gas & Electric Co., Union Electric Co. of Missouri, and Western Light & Telephone Co.

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City Will Fix Appliances

Shops of the city-owned and operated electrical distribution system of Roseville, Calif., will make repairs on electric appliances as a result of an ordinance passed by the city council. Roseville, although at present buying its power from the Pacific Gas & Electric Co., is the only municipality holding a contract with the Bureau of Reclamation for future delivery of Shasta Dam power (ELECTRICAL WORLD, September 22, 1945, page 9). The repair service will be given without charge except for materials plus a 10 percent handling charge.

MEETINGS

Previously Listed

Pennsylvania Electric Association — Engineering Section, all committees, Penn Harris Hotel, Harrisburg, Pa., May 28-29. E. B. Shew, chairman, Philadelphia Electric Co., 900 Sansom St., Philadelphia, Pa.

Edison Electric Institute—Annual convention, Waldorf Astoria Hotel, New York, N. Y., June 3-5. Col. H. S. Bennion, managing director, 420 Lexington Ave., New York 17, N. Y.

National Fire Protection Association—Annual meeting, Hotel Statler, Boston, Mass., week of June 3. R. S. Moulton, technical secretary, 60 Batterymarch St., Boston 10, Mass.

Pacific Coast Electrical Association—Annual convention, Fairmont Hotel, San Francisco, Calif., June 12-14. V. W. Hartley, managing director, 447 Sutter St., San Francisco 8, Calif.

National Electrical Manufacturers Association—Special sections meetings, The Homestead, Hot Springs, Va., June 17-19. W. J. Donald, managing director, 155 E. 44th St., New York 17, N. Y.

American Society of Mechanical Engineers—Semi-annual meeting, Book Cadillac and Statler hotels, Detroit, Mich., June 17-23. Ernest Hartford, executive assistant secretary, 29 W. 39th St., New York 18, N. Y.

American Society of Agricultural Engineers—Annual meeting New Jefferson Hotel, St. Louis, Mo., June 24-26. Raymond Olney, secretary, St. Joseph, Mich.

American Institute of Electrical Engineers—Summer convention, Hotel Statler, Detroit, Mich., June 24-28. H. H. Henline, secretary, 33 W. 39th St., New York 18, N. Y.

American Society for Testing Materials—Annual meeting, Buffalo, N. Y., June 24-28. R. E. Hess, assistant secretary, 260 S. Broad St., Philadelphia 2, Pa.

Canadian Electrical Association—Annual meeting, Banff Springs Hotel, Banff, Alberta, Canada, June 26-28. B. C. Fairchild, managing director, 704 Tramways Bldg., Montreal 1, Que., Canada.

OEC Watching Fuel Stocks; Slight Improvement Shown

The Office for Emergency Controls this week was waiting to see what the effect of President Truman's order seizing the coal mines would be before issuing any other orders.

Since urging states to adopt or prepare step-by-step curtailment programs aimed at equalizing and spreading out fuel stocks, OEC has done little but watch the situation and carry out surveys of the fuel stocks of utility systems.

Its latest survey, which covered a substantial portion of the electric systems having less than 30 days' supply, was incomplete early this week, but available returns presented a more cheerful picture than that for some time. They showed that most systems with less than 30 days' supply were obtaining their burn, plus small accumulations in the cases of those with less than 20 days' supply. Under a Solid Fuels Administration order governing disposition of coal produced during the truce, electric systems with less than 20 days' may purchase their burn plus enough to bring their stocks to 20 days. Early returns showed that most companies in this position were getting such amounts of coal.

Meanwhile, K. M. Irwin, Philadelphia Electric Co., and Clarence Mayott, special assistant to the president of the Hartford Electric Light Co., have been added to the OEC consulting staff. Both men formerly were consultants to the Office of War Utilities.

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Vote for Municipal System

Property owners of Kenogami, Que., have voted 394 to 315 to authorize the town to borrow $148,000 to buy the local electrical system from Price Brothers.

Irrigation District Agrees with Utility on Territory

San Diego Gas & Electric Co. and the Imperial Irrigation District have signed a 25-year agreement regarding limitation of power service in certain areas of San Diego and Imperial Counties, according to recent announcement by the California Railroad Commission. Under its terms, San Diego Gas & Electric is restricted to sale or distribution of power west of a line cutting off the southwestern portion of San Diego County. The Irrigation District is confined to sale of power for use in the northwestern part of the county, and in all of Imperial County, extending south to the Mexican border.

The agreement stemmed from the recent purchase by San Diego Gas & Electric of a part of a transmission line from Rincon to El Centro, owned by the Irrigation District. The line had been acquired from California Electric Power Co. in 1943, and basis for the new contract existed in a like limitation of service agreement between the District and California Electric.

Arrangements were approved in the agreement by which the utility and the district will maintain their portions of the continuous Rincon-El Centro line. Also they will provide each other with standby and emergency service as needed until November 1, 1947, at cost plus 15 percent.

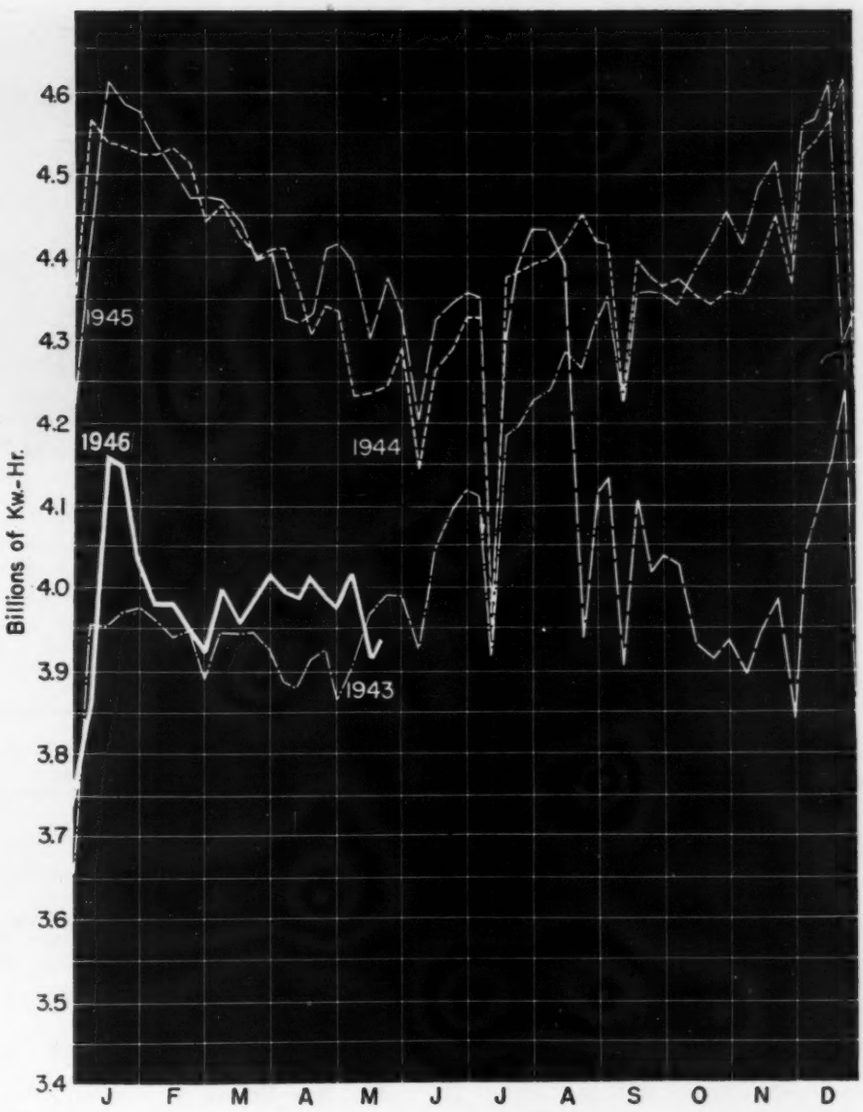
•

P.U.D. Proposals Defeated in 5 of 6 Oregon Elections

Of the six public ownership proposals voted on in Oregon May 17, only one was decided in favor of public power. In The Dalles, voters registered in favor of granting a franchise to the Northern Wasco County P.U.D., thereby allowing the P.U.D. to construct a competing system if it so elects. The city is currently being served by Pacific Power & Light Co.

Astoria voters defeated by a vote of nearly 3 to 1 a charter amendment to authorize the city to issue up to $2,000,000 of revenue bonds for a municipal power system.

At the same time, a proposal to set up a P.U.D. in Linn County, to include most of the settled county area outside the cities of Albany and Lebanon, was defeated for a fourth time, and a separate P.U.D. proposal in Linn County, including only the city of Lebanon, was turned down. Malheur County also rejected by a heavy vote the proposal for a county P.U.D., and residents of Northern Lincoln County, on the Oregon Coast, voted against a P.U.D. in that area.



Electric Output Curve Recovers Ground

Moving slightly upward, the electric output curve recovered during the week ended May 18, 1946, some of the ground it lost during the coal strike, according to figures released by the Edison Electric Institute. The amount of electrical energy distributed by the light and power industry totaled 3,939,281,000 kw.-hr., compared with 3,910,760,000 kw.-hr. during the preceding week. During the week ended May 19, 1945, the amount of electrical energy distributed amounted to 4,377,221,000 kw.-hr., this year's figure representing a decrease of 10.0 percent.

All of the seven major geographical regions of the country reported losses for the week ended May 18 as compared with the corresponding week of last year, the New England and Rocky Mountain groups entering the minus column, the former with a 1.6 percent drop and the latter with a 2.5 percent decrease. Two groups reported reduced losses.

Weekly Output, Millions Kw.-Hr.

1946		1945		1944	
May 18	3,939	May 19	4,377	May 20	4,246
May 11	3,911	May 12	4,302	May 13	4,238
May 4	4,012	May 5	4,397	May 6	4,234
Apr. 27	3,977	Apr. 28	4,416	Apr. 29	4,336
Apr. 20	3,987	Apr. 21	4,411	Apr. 22	4,344
Apr. 13	4,015	Apr. 14	4,332	Apr. 15	4,307
Apr. 6	3,988	Apr. 7	4,322	Apr. 8	4,361
Mar. 30	3,992	Mar. 31	4,329	Apr. 1	4,409
Mar. 23	4,017	Mar. 24	4,402	Mar. 25	4,409
Mar. 16	3,988	Mar. 17	4,398	Mar. 18	4,400
Mar. 9	3,953	Mar. 10	4,446	Mar. 11	4,426
Mar. 2	4,000	Mar. 3	4,472	Mar. 4	4,465

Percent Change from Previous Year

	Week Ending		
	May 18	May 11	May 4
New England	— 1.6	+ 1.6	— 4.1
Mid-Atlantic	— 3.7	— 1.2	— 3.1
Central Industrial	—14.4	—14.5	—12.2
West Central	— 3.6	— 2.9	— 5.6
Southern States	—13.4	—12.2	— 9.2
Rocky Mountain	— 2.5	+ 0.2	— 3.2
Pacific Coast	— 8.7	— 9.3	—10.7
Total United States	—10.0	— 9.1	— 8.8

SEC RULINGS

The Securities and Exchange Commission recently issued a series of orders affecting electric utility companies.

MIDDLE WEST CORP., CENTRAL & SOUTH WEST UTILITIES CO., and AMERICAN PUBLIC SERVICE CO. have been granted an extension of one year from February 16 within which to comply with the SEC's order for disposition by Central of its interest in certain non-utility properties in Texas and Oklahoma, and in the natural gas properties of Public Service Co. of Oklahoma, except those used to provide fuel for electric generating purposes. (Release No. 6607).

ASSOCIATED ELECTRIC CO.'s proposal to sell its entire investment in Arizona General Utilities Co. to Graham County Electric Cooperative, Inc., and the towns of Safford and Thatcher, Ariz., for $410,000, subject to adjustments, has been approved. (Release No. 6620).

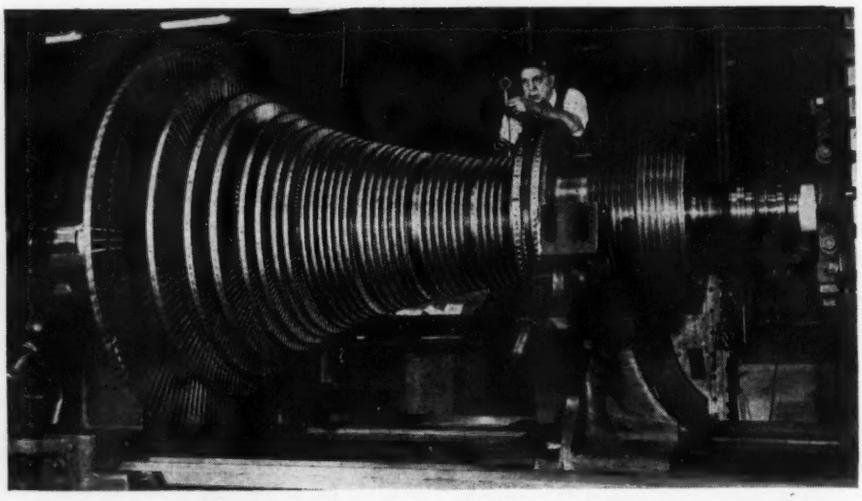
NEW ENGLAND PUBLIC SERVICE CO. has been permitted to withdraw its application for authorization to subscribe for some of the new common stock of two of its subsidiaries, Public Service Co. of New Hampshire, and Central Maine Power Co. (Release No. 6628).

CENTRAL MAINE POWER CO.'s sale of $13,000,000 principal amount of first and general mortgage bonds, the issuance and sale of 220,000 shares of new preferred stock and the exchange of this stock and the issuance and sale of as much additional $10 par common stock as may be required to provide approximately $10,000,000 have been released from SEC jurisdiction heretofore reserved with respect to competitive bidding. (Release No. 6618).

OHIO PUBLIC SERVICE CO.'s refinancing program providing for issue and sale at competitive bidding of $32,000,000 of first mortgage bonds due 1976 and 156,300 shares of $100 par cumulative preferred stock has been approved. The company also will issue and sell $6,000,000 serial notes at competitive bidding and $5,208,300 aggregate par value of additional common stock to Cities Service Power & Light Co., parent. Proceeds will be used to redeem outstanding first mortgage bonds, serial, mortgages and promissory notes and first preferred stock. (Release No. 6631).

CENTRAL & SOUTH WEST UTILITIES CO.'s compromise plan for merger of company and American Public Service Co., a subsidiary, new surviving company, Central & South West Corp., to have outstanding only 6,600,000 shares of $5 par common stock, has been approved. Both companies are subholding companies in Middle West Corp. system. In an order accompanying its decision, the SEC decreed that transactions involved must be carried out within 60 days after an appropriate U. S. District Court enters an order enforcing plan. (Release No. 6606).

CONTINENTAL GAS & ELECTRIC CORP.'s proposal to sell at competitive bidding 744,455 shares of $10 par common stock of Columbus & Southern Ohio Electric Co. has been approved. These shares represent entire interest of Continental Gas & Electric and its parent, United Light & Railways Co., in the Columbus unit. In an order of August 5, 1941, the commission directed Continental Gas & Electric and United Light & Railways to divest themselves of all interest in Columbus & Southern. With net proceeds, Continental Gas intends to pay off $20,000,000 of 1¾ percent one-year notes and apply balance on a pro rata basis toward prepayment of $30,000,000 of 2½ percent ten-year notes. (Release No. 6621).



PRODUCTION RESUMED—One of the first items to start on the road to completion with the return of production workers to Westinghouse plants is this steam turbine spindle for a 25,000-kva. generator. The unit will soon be on its way to Staten Island Edison's Arthur Kill station. It operates at 850 psi., 900 deg. F., weighs 25,000 lb., is 13 ft. long, and the last row of blades is 76 in. in diameter with a tips speed of 1,193 fps. The generator specifications are 25,000 kva. 80 percent pf., 13.8 kv., 3-phase, 60 cycle, hydrogen cooled

Expansion Plans Revealed

The New Brunswick Electric Power Commission has announced a $9,914,000 expansion program. Included are 385 miles of transmission lines, $2,614,000; 3,000 miles of distribution lines, $5,000,000; a steam generating station at Chatham, $2,000,000; and a number of substations, $300,000.

UTILITY REPORTS

	Net Income 1946	1945
*American Gas & Electric and subs	$14,707,739	$12,319,713
*California Electric Power and subs	1,399,517	1,256,539
*Cleveland Electric Illuminating and sub.	6,262,288	5,781,130
*Columbia Gas & Electric and subs	18,707,752	14,136,676
†Consumers Power	9,370,511	7,055,524
‡Louisiana Power & Light	1,284,111	1,122,304
‡Mississippi Power & Light	1,280,405	1,437,569
‡Montana Power	4,225,183	4,235,111
†Ohio Edison	4,824,070	3,507,517
*Pacific Gas & Electric	24,699,827	21,972,278
*Puget Sound Power & Light and subs	4,389,189	4,908,893
*West Penn Power and subs.	7,238,847	7,383,933

† Twelve months ended April 30.
* Twelve months ended March 31.
‡ Twelve months ended February 28.

BPA Will Build Feeder Lines Only in Idaho in '46

Bonneville Power Administration announced its tentative plans for Idaho recently with a statement that no major power lines are planned for construction during the 1946 fiscal year but some miscellaneous feeder line extensions will be constructed in northern and western Idaho.

Present plans call for construction of feeder lines from Lewiston to Spaulding to serve the Clearwater Valley Light & Power Association, and from Spaulding to Grangeville to serve the Idaho Light & Power Cooperative Association; from Trentwood, Wash., to Sandpoint and Bonners Ferry to serve the Northern Idaho REA; from Trentwood to Harrison Flats and Coeur d'Alene to serve Kootenai County REA.

These agencies have signed power contracts with the BPA and now are being served by transfer.

Gets 50-Year Franchise

The Southern California Edison Co. has been granted a 50-year franchise to operate in Kern County, California, by the board of supervisors. The franchise was approved in spite of rural opposition which claimed the long term would endanger the development of the Central Valley project by the Bureau of Reclamation. Under terms of the agreement the utility will pay the county 2 percent of the annual gross.

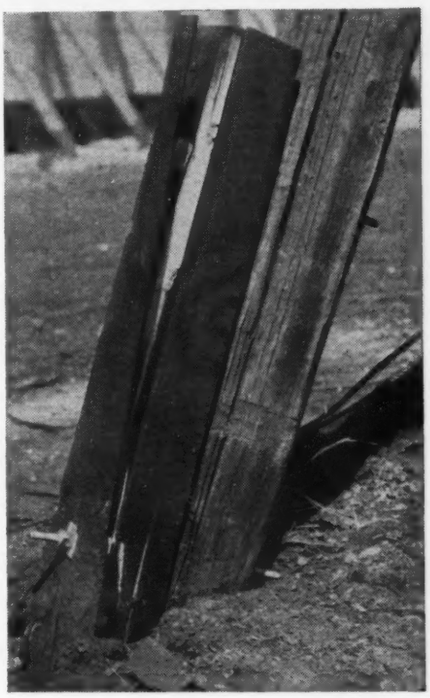
HOW

DESIGN • CONSTRUCT • OPERATE • MAINTAIN

Railroad Ties Cut Stubbing Cost 60 Percent

SHORTAGE OF CEDAR for stubbing poles, coupled with constantly rising prices, led The Washington Water Power Co. to experiment with, and adopt, standard creosoted railroad crossties as a substitute. Fir and tamarack ties which have been incised and treated by the pressure method are being used. By November 15, 1945, approximately 500 ties had been installed on rural distribution poles at a saving of 60 percent in cost of material. The 8-ft. ties are set 4 ft. 6 in. in the ground and attached to the pole with through-bolts as shown. No split-bolt is used at the top of the tie, except where the tie is season checked. These cases have been less than 3 percent and, therefore, the additional expense of boring and split-bolting all ties is not warranted.

Field tests showed that the standard 8-ft. tie had sufficient mechanical strength for stubbing 35- and 40-ft. rural line poles, which carried light conductors. Under these limitations the additional cost of the 10-ft. switch tie, also available, was not justified. Crewmen have been enthusiastic over this method of stubbing, and there has been no objection to the handling of the full-length treated ties.



TESTS SHOWED failure of tie stub at 1,400-lb. side pull and 400-lb. in-line pull—far in excess of stresses on light rural lines

STANDARD 6x8-in. by 8-ft. treated railroad ties, set 4 ft. 6 in. in ground and bolted to poles, displace scarce cedar for stubbing poles. Railroad ties weigh only 90 lb. as compared with 200 lb. for cedar stubs previously used (Right)

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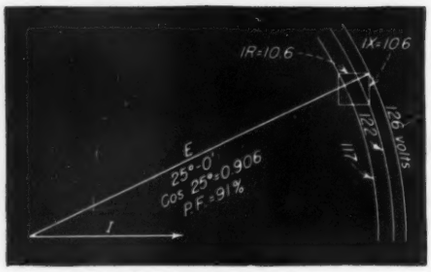
Drop-Compensator Gives Circuit Power Factor

C. N. TEED
Engineer, Idaho Power Co., Boise, Idaho

OCCASIONALLY it is desirable to obtain the power factor of the load on a distribution feeder when an instrument usually employed for this purpose, such as a power factor meter or a phase angle meter, is not at hand. Assuming that the feeder is wye connected, or single phase, that the feeder voltage regulators are equipped with line drop compensators and that the potential transformer is connected phase to neutral, the power factor of the load can be readily obtained with only a voltmeter and an ammeter.

The procedure is first to open the motor control circuit on the regulator so as to prevent mechanical operation of the regulator. The voltmeter is then connected to the "load center voltage" test terminals and both the resistance and reactance compensation are cut to zero. Next the ammeter is cut in series with the compensator and the current is noted. The reading of the voltmeter (126, say) is noted and then first the 24 volts of resistance compensation and next the 24 volts of reactance compensation are cut in with the voltmeter readings recorded in each instance (117 and 122 respectively).

The next step is the graphical solution. Three concentric circles are



MERELY an ammeter and voltmeter are needed to get load power factor if R and X of compensator are used to locate the E and I vectors

drawn to any convenient scale of the three voltage readings that were obtained. Then a square is cut out of paper whose sides are equal to the IR and IX drops in the compensator to the same scale as the voltage circles. As the conventional compensator is rated at 24 volts resistance drop and reactance drop with 5 amperes flowing, the X and R are each equivalent to $\frac{24}{5} = 4.8$ ohms. Consequently the IX and IR drops in the compensator are each numerically equal to the product of the observed current and 4.8 with maximum compensator settings. The paper square is then laid on the voltage circles with one corner touching the outer circle, and with the top edge kept horizontal it is slid around until the other opposite corners coincide with the other two voltage circles. At the point of contact with the outer circle a line should be drawn to the center of the circles. This is the voltage vector when the current vector is assumed horizontal. The cosine of the angle formed is the power factor of the load. An example follows:

Current in compensator circuit = 2.2 amp.

Load center voltage with 0 compensation = 126 volts.

Load center voltage with 24 volts reactance compensation = 122 volts.

Load center voltage with 24 volts resistance compensation = 117 volts.

Equivalent R of compensator at 24 volt setting = 4.8 Ω.

Equivalent X of compensator at 24 volts setting = 4.8 Ω.

IR of compensator = 2.2 × 4.8 = 10.56 volts.

IX of compensator = 2.2 × 4.3 = 10.56 volts.

Power factor found = 90.6 percent.

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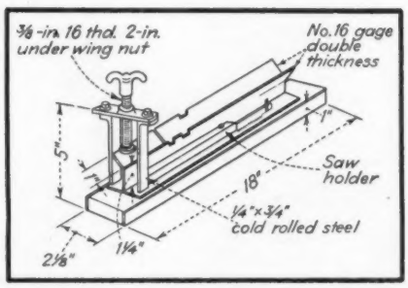
Clamp Facilitates Cutting Armor from Cable

CUTTING flexible conduit and armored cable with a hack saw during construction and maintenance jobs in and around the station has resulted in many a minor cut and barked finger. The need for a tool which would keep the fingers away from the cutting blade has been apparent to maintenance crews for some time.



DETAILS of "miter-box" clamping device which facilitates the safe cutting of armor from armored cable, cutting conduit and flexible tubing

Edward V. Pierce of the construction division of the Philadelphia Electric Co. has made a tool for this purpose which is light enough to be held in the hand. It can also be clamped to a bench or held in a convenient position by a bench vise.

It has a trough in which the cable or conduit is laid and a clamping device to hold the cable firm during the cutting operation. On one side is a holder which will accommodate six blades. The complete assembly is screwed to a 2⅞-in. by 18-in. wooden block.

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Field Control for Synchronous Condenser

P. H. ADAMS
Consulting Electrical Engineer
Electric Engineering Dept., Public Service Electric and Gas Co., Newark, N. J.

A NUMBER of synchronous condensers were installed recently by Public Service Electric and Gas Co. which had an output ranging from 100 percent leading kva. to 50 percent of that value lagging. To attain this range of output and control it either manually or by means of a rheostatic type regulator, an unusual method of excitation is employed which may be of interest to others confronted with this problem.

The exciter is a standard direct-connected d.c. 125-volt self-excited shunt generator with a motor-operated field rheostat suitable for use with a rheostatic type regulator. The operating motor is of the double series field type and uses the control circuit described on page 142 of the ELECTRICAL WORLD of October 14, 1944.

The exciter voltage is stabilized by means of a small dynamotor and the leading and lagging output limited by means of two adjustable resistors external to the field rheostat. The accompanying diagram shows the connections which may be briefly described as follows:

The exciter is connected directly to the condenser field with a shunt in the positive lead to supply an ammeter for field current and a relay for short circuit protection.

The field of the exciter has one terminal connected to the negative armature terminal while the other connects to the field rheostat. This rheostat has two equal sections, R_s and R_t, of resistance connecting from A to B and from A_1 to B_1 with the desired number of equal steps connected to contact buttons. A contact bar extends from B to D while from B_1 to C_1 a resistance 1.7 times that from A_1 to B_1 connects to contact buttons in the usual manner. A final button not connected to the rheostat resistance connects to terminal D_1.

The A_1 terminal of the rheostat connects to the external resistor R_x and through a normally closed relay contact to the positive terminal of the exciter armature.

The stabilizing dynamotor generator rated at 40 volts and 3 amp. has its positive terminal connected through a switch, an ammeter shunt, and a normally closed relay contact to the B_1 terminal of the field rheostat. Its negative terminal connects through a switch to a fixed terminal of one

section of external resistor R_y. The fixed terminal of the other section of R_y is connected to terminal C_1 of the field rheostat and to the negative terminal of the exciter armature and field.

The free D_1 terminal on the rheostat face plate is connected to the sliding contacts on the two sections of the external resistor R_y.

With the resistor R_x in the all-out position, operate the condenser at full output leading until temperatures are constant, then make the following adjustments:

(1) Set at the resistance all-in points the sliders on resistor R_y which are connected to D_1.

(2) Move rheostat arm to the D to D_1 position.

(3) Adjust sliders on R_y so that the exciter armature voltage reverses to a value of not more than 3 volts, and the dynamotor ampere load is not more than 3 amp. at its rated voltage, and lock the two sliders.

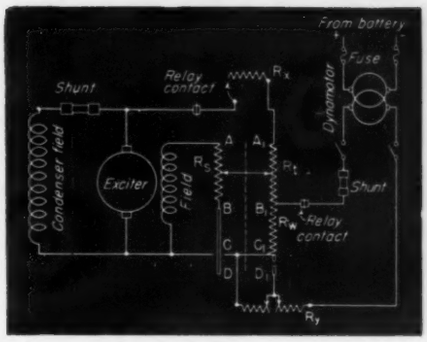
(4) Move the slider on the R_x resistor to the all-in position and operate the field rheostat until the arm reaches the A to A_1 position, resistance all out.

(5) Adjust resistor R_x to give 100 percent leading kva. on the condenser and lock the slider.

The excitation system is now ready for operation either manually or by means of an automatic device which controls the rheostat operating motor.

The limitation of 3 volts in the reverse direction on the exciter is for the purpose of retaining as high a degree of stability on the condenser as possible with the lagging output equal to 50 percent of its rating.

Should the reverse excitation go much higher than that given above, the probability of slipping a pole during a system disturbance would be greatly increased. The slipping of a pole under such conditions would tend to accentuate the disturbance.



FIELD exciter voltage stabilized by the small dynamotor

The approximate values of resistance used are: $R_s = 12$ ohms $= R_t$; $R_w = 20$ ohms; $R_y =$ two 5-ohm units for 4 amp. continuously; R_x is determined by the exciter field resistance.

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Condenser Pop Locates Aerial Cable Fault

FLOYD W. BUCK

Industrial Engineer, United Illuminating Co., New Haven, Conn.

A CABLE FAULT locator operating on the condenser discharge principle was recently constructed by the United Illuminating Company. It operates by charging 2 mf. of capacitors to about 10,000 volts and permitting these capacitors to discharge through a sphere gap to the cable tested and thus through the fault to ground. This discharge creates a loud crack at the sphere gap and at the fault and the crack at the fault can be heard for considerable distance under quiet conditions.

The high voltage transformer is an ordinary 6,900/120-volt potential transformer. The resistor limits the charging current to the maximum current rating of the tubes which serve as rectifiers. Two filament transformers, two tubes and two 1-mf. capacitors were used with the thought that if a higher voltage is needed, a doubler circuit could be installed with the tubes operating in a voltage doubler circuit.

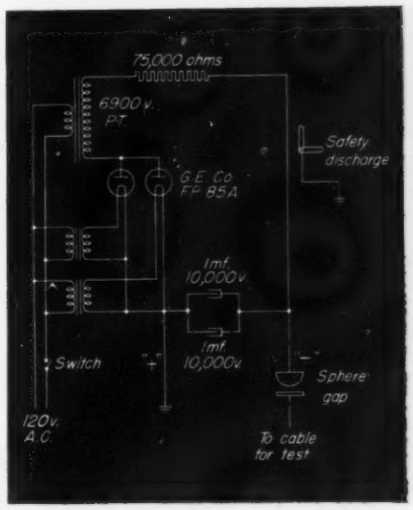
The maximum voltage charge on the capacitors is, of course, 6,900 volts times 1.414 or 9,756 volts. This charge voltage can be regulated by adjusting the sphere gap, the sole function of which is to prevent the capacitors from discharging to the cable until a voltage is reached as determined by the gap opening. Closing the gap reduces the charging period and increases the frequency of the discharge. The most convenient frequency of discharge is about one a second.

The gap is connected to the cable to be tested by a shielded cable, the shielding of which is grounded before starting a test.

Since only 2 mf. of capacitors is used, it is possible to have so much capacity in the cable to be tested that a sharp crack at the fault will not occur. There has been insufficient experience to state definitely the maximum length of cable that can be tested.

The set is installed in a wooden box with proper grounding shields and leads installed inside and with a hand-operated capacitor discharge lever available on the outside of the box to discharge the capacitors completely after use. The sphere gap can be adjusted externally by a slotted insulating rod attached to the gap shaft.

The total cost was $340.00. Its design is patterned on a similar locator constructed by the Philadelphia Electric Co.



DISCHARGE from 2-mf. condensers can be heard considerable distance from point of fault in aerial cable

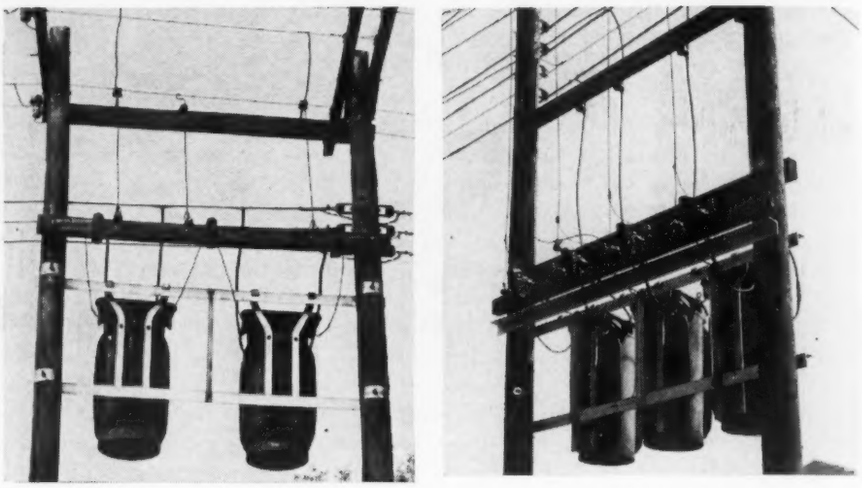
Although this locator is intended for use on aerial cables where the sound can more easily be heard, it is also useful on underground cables. It produces a thump in the manhole which can be heard two manholes distant from the fault under quiet traffic conditions. This necessitates entering several manholes until the thump can be heard and the fault located. It is planned to add a milliammeter in the charging circuit and a kv. meter across the capacitors; it is hoped these will assist in identifying the type of fault.

Transformer Rack, 4-in. Angle

G. P. WOMBLE
General Manager, Rocky Mount (N. C.) Public Utilities

TWO OR THREE 50-kva. transformers can readily be hung by means of a standard hanger on a 4-in. angle between two poles with a second 4-in. angle serving as a kick plate. The customary construction involves using a secondary rack on each pole to carry the secondary bus and run to which the transformer secondaries are connected.

As shown in the illustration it is possible in this construction to keep the primaries and secondaries on opposite sides of the pole. This makes fuse replacement a safer procedure because the common neutral ground is on the other side of the pole.



TRANSFORMERS on angle-iron, secondary on rack

There has been no reason evolved from the experience which would deter mounting even larger transformers in the same way, merely using a larger angle to obtain the necessary increase in strength.

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Distribution Staff Duties Summarized

General Line Foreman

THIS official is responsible for the proper execution according to plans supplied him of all work orders for line construction, maintenance and repairs of both overhead and underground systems. All such work is required to be done in accordance with specifications contained in company construction standards. The foreman is also responsible for furnishing information for maps and records in connection with this work as called for in any detailed instructions issued by the company. His duties include charge of the inspection of manholes at such times as are requested by the company's joint line representative, following company instructions for covering such work. The removal of snow is also in his province as required in detailed instructions.

This foreman may order such lengths of cable junked as he considers unfit for further service. He is required to perform such duties in connection with street lights and traffic signals as are provided in instructions for keeping records of this equipment, and to make reports in the departmental book of unusual troubles. The inspection for quality of all line hardware and weatherproof wire for sale is under his jurisdiction.

* One of a series of presentations covering the essential duties of officials of a public utility distribution department serving between 50,000 and 75,000 meters. First installment in ELECTRICAL WORLD, October 13, 1945, page 106.

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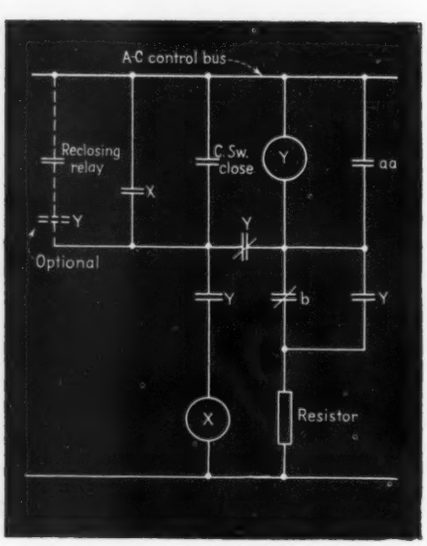


SCHEME for having breaker control on a.c. control bus free of pumping action after a fault

Breaker Closing Control Rendered Pump-Free

OLIVER RAMSAUR
Control Equipment Engineer, Pennsylvania Power & Light Co., Allentown, Pa.

TO MEET A DEMAND for an a.c. circuit breaker closing control scheme that would be pump-free if the breaker were closed on a nearby fault that reduced the voltage to the point where the usual cut-off relay would not pick up, but at the same time one that could be adapted to existing remote control without requiring replacement of the old control switch or another wire in the control cable, the scheme illustrated in the elementary diagram was evolved.

Enlarging on the principle of letting an auxiliary switch on the breaker set up the closing circuit when the breaker trips,* the cut-off relay Y is energized by the "b" switch to set up the closing circuit, to the closing relay seal in, and be dropped by the action of the cut-off switch "aa" in short-circuiting its coil when the closing mechanism reaches the end of its travel.

The pump-free feature is obtained by a back contact of the cut-off relay Y, which parallels the coil of Y with the closed contact of the control switch, thus preventing Y from picking up

* "Rectox-Operated Circuit Breakers", B. L. Hayward, ELECTRICAL WORLD, November 25, 1944.

Uses New, *Universal* Fuse Link — Has *New* Design Features — FOR BETTER PROTECTION, GREATER ACCURACY, LONGER CONTACT LIFE

OIL FUSE CUTOUT

"I'm built to deliver more circuit protection than ever," says this improved G-E fuse cutout. "With my new, universal fuse link, I have higher short-circuit interrupting capacity—can safely clear fault currents up to 11,000 amperes (depending upon my rating)—under circuit conditions tougher than fuse cutouts ever meet in service."

THE Textolite insulating support is stronger, gives higher flash-over level, and provides a more solid foundation for stationary contacts. These features add greater interrupting ability.

The contacts are designed to confine all arcing, when the circuit is opened, to special arcing surfaces well under the oil, keeping the load-carrying contact surfaces permanently clean. This permits repeated switching of load current —with either disconnecting blades or fuse links.

UNIVERSAL FUSE LINKS—an entirely new feature—replace earlier plain and reactive-type links. They can be used in the improved G-E cutout—and in older types too—with price savings of as much as 40 per cent over the superseded plain-type links, and even more, over the reactive type. These new universal fuse links reduce the number of items required in stock—one line of *universal* ratings is now applicable to 100-, 200-, and 300-ampere cutouts.

USE G-E OIL FUSE CUTOUTS where you require:

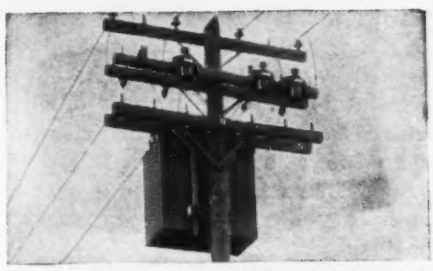
1. High interrupting capacity
2. Quiet and safe operation, with no exposed live parts and no expulsion of arc flame
3. Dependable operation when completely submerged
4. Gang operation of two or three units

NEW G-E UNIVERSAL FUSE LINKS carry 100 per cent of rated current continuously in 100-, 200-, and 300-ampere cutouts. The accuracy of their time-current characteristics equals that of G-E expulsion-type fuse links. When used in the improved cutouts, they permit higher continuous current ratings at 5000 volts, and increased interrupting ratings at all voltages. In the earlier cutouts, they permit interrupting ratings as high as the previous reactive-type links.

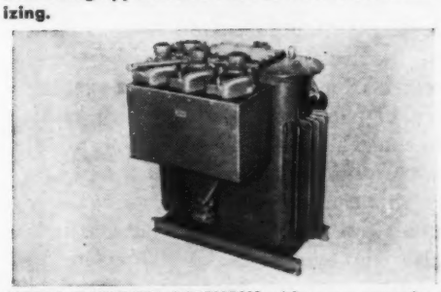
YOUR G-E REPRESENTATIVE can supply further information (HB 5350 to 54). Our descriptive booklet (GEA-732) is being revised and will be sent upon request as soon as it is completed. Address inquiries to your nearest G-E office or to General Electric, Schenectady 5, N. Y.

GENERAL ELECTRIC

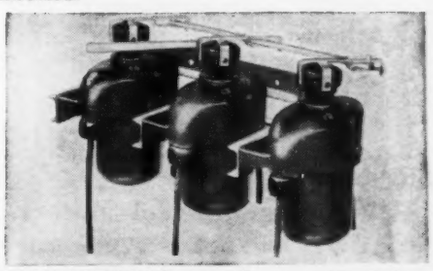
406-18-5254



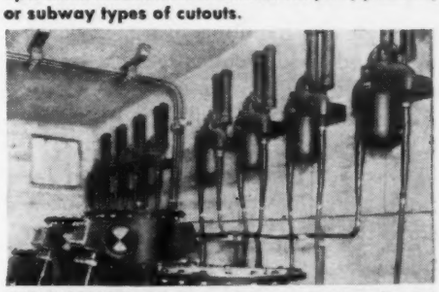
POLE-MOUNTED INSTALLATION of pole-type oil fuse cutouts. Can be used indoors or outdoors for connecting apparatus to lines or for line sectionalizing.



METAL-ENCLOSED ASSEMBLY with gang-operating mechanism—mounted directly on 3-phase transformer. Assemblies can also be separately mounted.



GANG ASSEMBLY (pole type) arranged for 3-phase operation. Mechanism available for pole, pothead, or subway types of cutouts.



SUBWAY-TYPE oil fuse cutouts equipped with expansion chambers in underground vault. This type is advantageous for submersible or semi-hazardous locations.

again so long as the control switch is held closed. The series resistor prevents short circuiting the supply bus.

The scheme is suitable for use with automatic reclosing relays and, unlike other schemes, is itself inherently pump-free if the reclosing contact hangs up for any reason. In some cases where the initial reclosure is instantaneous, however, it may be necessary to add the optional contact of Y in the circuit to the recloser, to insure that Y will open its back contact before the reclosing contact short circuits its coil. This feature will require three poles for relay Y, which otherwise can be any suitable two-pole double-throw relay.

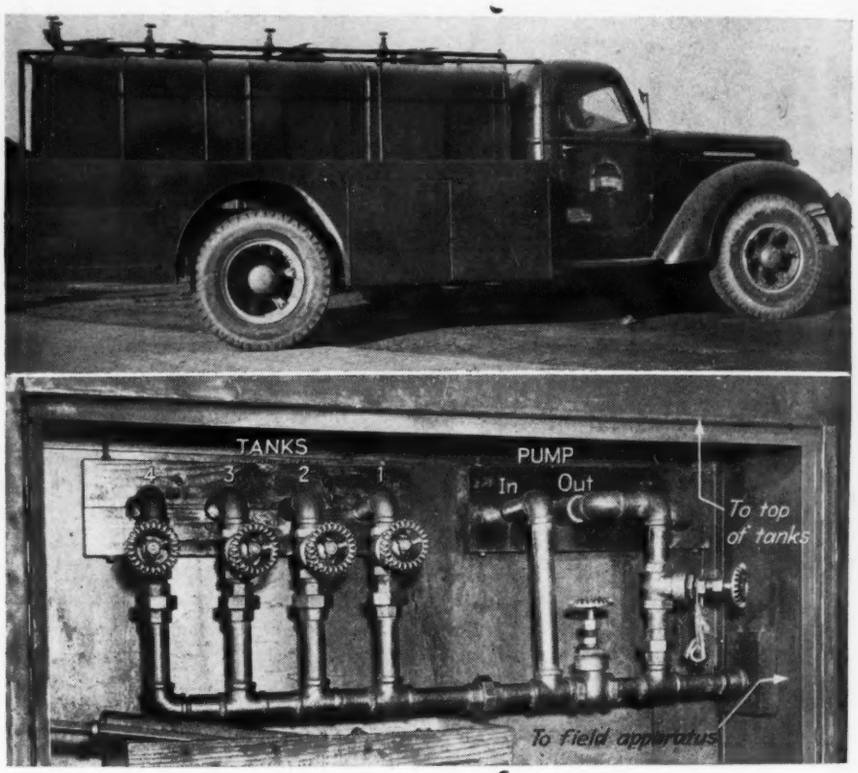
• • •

Special Oil Handling Truck

PIPING AND VALVE arrangement on the 1,200-gal. tank truck that is used in conjunction with filtering equipment to process oil in transformer and circuit breakers on the Memphis Light Gas & Water Division system is ingeniously designed to provide complete flexibility in the transfer of oil between tanks on the truck and apparatus in the field.

Four tanks are mounted on the five-ton truck, shown. From front to rear these tanks have capacities of 400, 300, 300 and 200 gal. respectively. The truck's oil pump, driven from a power take off, in conjunction with a valve system built into a side compartment of the truck permits oil to be transferred from one tank to another on the truck, from any and all truck tanks to external apparatus and from external apparatus to any or all truck tanks.

This truck is normally and regularly used with filtering equipment but it is also employed to make a complete oil change, carrying new oil to the field and returning with old oil to be reconditioned at the transformer repair shop. For moving large quantities of oil, however, the division uses a large 4,300-gal. tank truck.



TANK TRUCK—Used with filtering equipment to recondition breaker oil in the field this truck carries 1,200 gal. in four tanks. In the lower illustration, pump and valve arrangements permits transfer of oil between tanks; from tanks to apparatus and from apparatus to tanks. In the upper illustration, pipes atop truck also permit filling tanks from an external pump

• • •

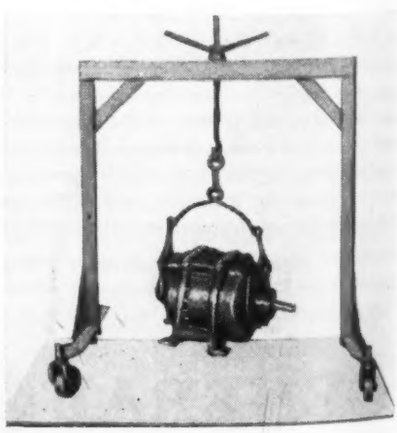
Straddle Hoist Aids Handling of Motors

A DEVICE which can be set astride motors and other equipment to facilitate the handling has been developed and used frequently in a textile mill, according to an engineer of the American Mutual Liability Insurance Co., Boston.

Many of the electric motors in the mill are fastened to the floor and occasionally replacement is necessary. Four men were required to lift the motors by means of bars and blocking to clear the foundation bolts. To prevent recurrence of an accident to an employee during such operations, the small portable hoist was designed and built.

Few parts are required for the hoist. The straddle frame is approximately 4 ft. high and is made of 2-in. tee and angle iron. Maneuverability is provided by small caster wheels attached at each corner. A large screw passes up through a hole in the top member and then through a threaded hub on a hand wheel which when rotated raises or lowers the screw. Two steel hooks are attached to the screw and the free ends placed in the motor frame.

When the frame is placed, hooks attached, and hand wheel turned, the motor can be lifted clear of the bolts and can be wheeled away. This operation of replacing a motor requires only one employee, thereby saving the time of three men and reducing the hazard in lifting the motors.



STRADDLE HOIST for motors

IN THE PUBLIC'S INTEREST—
but not in its eye

HERE are the successors to the radial-wave reflector—two new G-E suburban reflectors that now bring scientific light distribution to the lighting of residential streets. Light formerly dissipated in non-useful directions is utilized to better advantage. Direct glare is greatly reduced. Uniformity of illumination on the road is much improved, yet installation and maintenance are easy.

Two types—open and enclosed—using series lamps of 1000- or 2500-lumen rating are available with adapters to fit practically any fixture that takes the standard-dome radial-wave reflector. They may be installed either as unit-for-unit replacements to provide better light distribution, or in accordance with I.E.S. Recommended Practice to obtain specified illumination levels at low cost.

These G-E suburban reflectors offer utilities an inexpensive way to improve suburban lighting in their communities and to keep that lighting at high efficiency for years of low-cost service. Why not check the features listed here, then ask your local G-E representative how these reflectors can fit into your suburban streetlighting plans? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*

SCIENTIFIC LIGHT CONTROL

A highly efficient light distribution pattern effectively utilizes much of the light ordinarily wasted in producing objectionable glare and illumination of house fronts.

HIGHER LIGHTING LEVELS

When equipped with the new G-E 2500-lumen lamp of 5⅜-inch light-center length and spaced as recommended, I.E.S. Standards for suburban lighting can be readily met.

USE TWO WAYS

1) *In existing installations* as unit-for-unit replacements for radial-wave reflectors.
2) *In new installations* to provide higher lighting efficiency and more uniform illumination.

LOW MAINTENANCE COST

Alzak-processed aluminum reflectors retain high efficiency for years under all weather conditions, and are easily cleaned when necessary. Enclosed type has refractor spun-sealed to keep out dirt and to practically eliminate breakage.

(a) Form 79 CR luminaire with enclosed suburban reflector. Simple latches and safety chain facilitate relamping.

(b) Form 45 L luminaire with open suburban reflector. Either one or two shields may be easily attached if needed.

Are you tieing in with the NEMA plan to give America better street lighting?

Good Street Lighting
BUILDS GOOD WILL

GENERAL ELECTRIC

452-30-3010

How to Determine Transformer Polarity

This presentation of transformer polarity—what it is, how to determine polarity of an unknown transformer and how to connect transformers of unknown polarity—appeared in the new "Handbook for the Construction of Electrical Supply Lines" of Wisconsin Power & Light Co., Madison, Wis.

POLARITY of a transformer is (1) the relative direction of the induced voltages in the secondary windings with respect to the primary *at the terminals of the windings* at a given instant or (2) the relation of the high-voltage and low-voltage leads with respect to each other.

Transformers are marked, either on the terminals or on the drawing, to indicate polarity. Generally, the highest voltage terminals are indicated by the letter "H;" the next highest by the letter "X" and if there is a still lower voltage winding, by the letter "Y." In some special transformers there may be a deviation from this rule; therefore it is well to refer to the drawings for definite indication of terminals.

Figs. 1 and 2 indicate the windings of transformers having additive and subtractive polarity, respectively. When the induced voltages of the high- and low-voltage sides are in opposite directions at the terminals as in Fig. 1, the polarity is additive and when the induced voltages are in the same direction, as in Fig. 2, the polarity is subtractive.

Two Tests

Here are two simple tests that can be used to determine the polarity of an unfamiliar transformer:

Test A. Connect the transformer to an a.c. source as shown in Fig. 3, using a voltage that will not exceed the insulation of either winding. Measure the voltage from (1) to (2) by first connecting as shown in the line (2-V); second, measure the voltage from (2) to (3) after opening the voltmeter connection to point (1) and making the connection shown by dotted line (3-V). If this new reading is greater than the first, then the polarity is additive; if less, then the polarity is subtractive.

Test B. Connect a d.c. source, such as a battery, to the terminals of either winding and a d.c. voltmeter to the terminals of the other winding, as shown in Fig. 4a, so that a positive deflection is obtained. Then connect the voltmeter leads to the other winding, as shown in Fig. 4b, leaving the d.c. source connected as before. Now open the d.c. source. The inductive kick will deflect the voltmeter pointer either up the scale or against the zero stop. If the pointer swings as before, the transformer is additive; if it bears against the zero stop, its polarity is subtractive.

Connections Involved

Polarity as such is of no importance when only one transformer is used in an installation. It is, however, very important when two or more transformers are connected in parallel as single-phase units or banked as 3-phase units.

Consider that transformer A having subtractive polarity, and transformer B having additive polarity are connected as shown in Fig. 5 to supply 3-phase, 240-volt power. They will produce the voltages indicated. To correct this condition and obtain 240 volts between all phases, reverse the secondary leads (or the primary leads) of one transformer as shown by dotted lines. When three single-phase transformers are connected in 3-phase bank and one has a polarity different from the other two, an actual short circuit will result.

Consider another case, Fig. 6, in which a transformer A of unknown polarity is to be connected in parallel with transformer B of positive polarity a few spans away in order to increase capacity of the secondary line. Procedure is as follows: (1) Connect the neutral of B to the line neutral. (2) Make connections in usual manner to the primary line. (3) Connect a 230-volt lamp or voltmeter between either outside line conductor and one transformer terminal. If no voltage or a very small amount is indicated, the secondary connection may be completed. If polarity was not matched, double voltage or about 230 volts would be indicated by the test. In that case the secondary leads must be reversed. Two transformers of opposite polarities connected solidly in parallel will result in a short circuit.

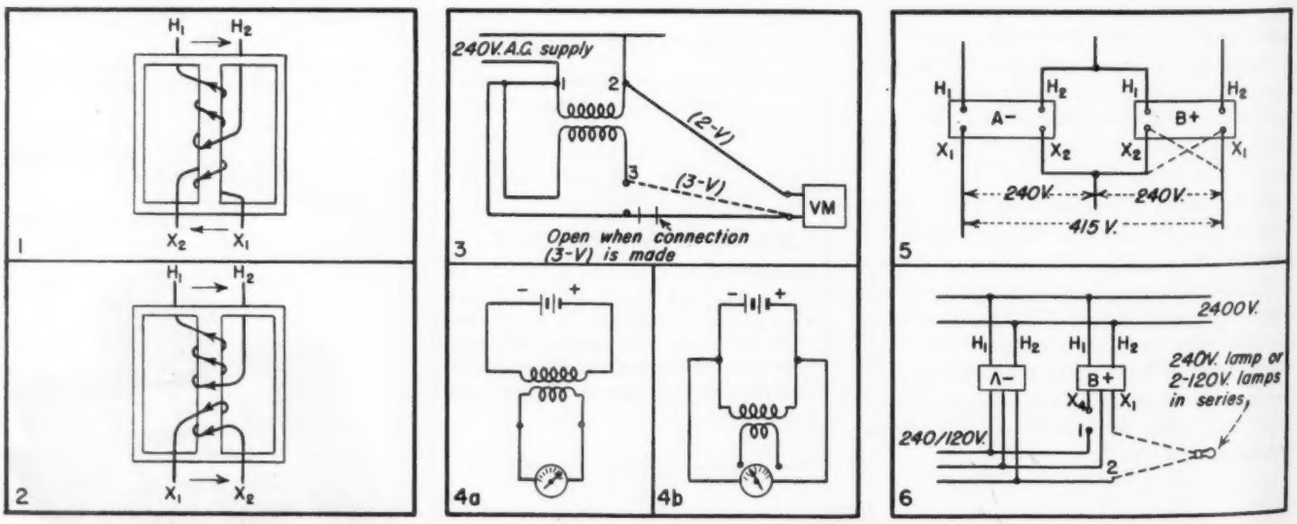
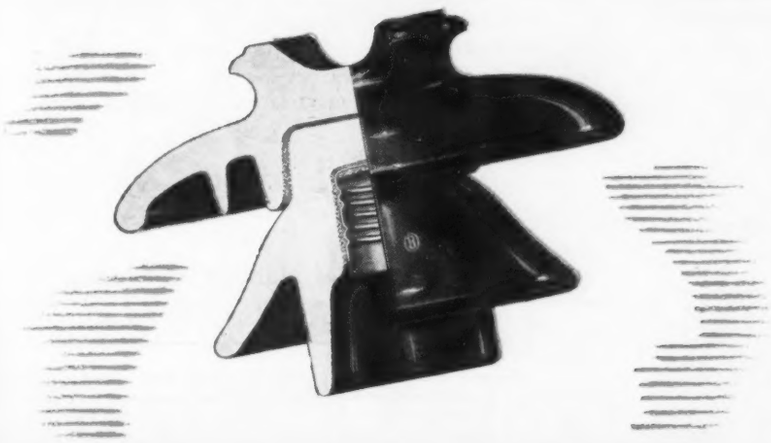


FIG. 1. Additive polarity . . . FIG 2. Subtractive polarity . . . FIG. 3. Polarity determined by alternating-voltage tests . . . FIG. 4. Polarity test by inductive kick with direct current . . . FIG. 5. Open-delta connections for transformers having known polarity . . . FIG. 6. Connections to determine polarity for parallel operation of single-phase units

O-B PINTYPES KNOW HOW TO "Roll with the punches"



WHEN LIGHTNING STARTS to ground, a pintype insulator on top of a pole is scarcely more than a fly speck in the way of such a vast rush of power. Two things can happen. The insulator can be destroyed or it can "roll with the punch" and survive; ready to go along with its regular duties, for which it is adequate.

Under the extremely steep wave fronts known to exist in some lightning discharges, flashover does not take place fast enough to prevent a brief but tremendous electrical stress falling on the porcelain. A good pintype insulator must withstand this. It calls for "plenty of insulator" skillfully designed.

The presence of these desirable qualities in an insulator is not obvious. You can't find them just by looking for them--you must *know* they are there; and putting them there is a function of intelligent insulator manufacture.

Sound design, and an ability to make them *right,* has saved the life of many an O-B pintype insulator and saved a lot of trouble and expense for its owner. Pintypes look alike - granted - but over a period of years their behavior is *anything but alike.* For top performance, build with O-B!

2650-H

Ohio Brass

MANSFIELD, OHIO

CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

HEADQUARTERS FOR PORCELAIN INSULATION

Weights and Datum Costs Of Bare and TBWP Conductors

PAGE W. CHOATE, Senior Engineer, Carolina Power & Light Co., Southern Pines, N. C.

TABLES GIVE WEIGHTS of bare and triple braid weatherproof conductors of commercial grade copper, solid and stranded construction, in popular sizes from No. 8 to 1,000,000 cir. mils and for a range of distances from 100 to 1,000 ft. often encountered in secondary distribution service.

Another table provides similar data for other kinds of conductors, namely, steel, Copperweld, and ACSR.

WEIGHT OF WIRE IN POUNDS

Table I—Bare Copper Wire, AWG or Mcm.

DISTANCE, FT.	SOLID				STRANDED						
	8	6	4	2	1/0	2/0	3/0	4/0	250	500	1000
100	5.0	8.0	12.6	20.1	32.6	41.1	51.8	65.3	77.2	154.4	308.8
200	10.0	15.9	25.3	40.2	65.1	82.2	103.6	130.7	154.4	308.8	617.6
300	15.0	23.9	37.9	60.3	97.7	123.3	155.4	196.0	231.6	463.2	926.4
400	20.0	31.8	50.6	80.4	130.3	164.4	207.2	261.3	308.8	617.6	1235.0
500	25.0	39.8	63.2	100.5	162.9	205.5	259.1	326.7	386.0	772.0	1544.0
600	30.0	47.7	75.8	120.5	195.4	246.5	310.9	392.0	463.1	926.4	1853.0
700	35.0	55.7	88.5	140.6	228.0	287.6	362.7	457.3	540.3	1081.0	2162.0
800	40.0	63.6	101.1	160.7	260.6	328.7	414.5	522.6	617.5	1235.0	2470.0
900	45.0	71.6	113.8	180.8	293.1	369.8	466.3	588.0	694.7	1390.0	2779.0
1000	50.0	79.5	126.4	200.9	325.7	410.9	518.1	653.3	771.9	1544.0	3088.0

Table II—Triple Braid Weatherproof Wire, AWG or Mcm.

DISTANCE, FT.	SOLID				STRANDED						
	8	6	4	2	1/0	2/0	3/0	4/0	250	500	1000
100	7.5	11.2	16.4	26.0	42.4	52.2	65.3	80.0	98.5	189.4	367.4
200	15.0	22.4	32.8	52.0	84.8	104.4	130.6	160.0	197.0	378.8	734.8
300	22.5	33.6	49.2	78.0	127.2	156.6	195.9	240.0	295.5	568.2	1102.0
400	30.0	44.8	65.6	104.0	169.6	208.8	261.2	320.0	394.0	757.6	1470.0
500	37.5	56.0	82.0	130.0	212.0	261.0	326.5	400.0	492.5	947.0	1837.0
600	45.0	67.2	98.4	156.0	254.4	313.2	391.8	480.0	591.0	1136.0	2204.0
700	52.5	78.4	114.8	182.0	296.8	365.4	457.1	560.0	689.5	1326.0	2572.0
800	60.0	89.6	131.2	208.0	339.2	417.6	522.4	640.0	788.0	1515.0	2939.0
900	67.5	100.8	147.6	234.0	381.6	469.8	587.7	720.0	886.5	1705.0	3307.0
1000	75.0	112.0	164.0	260.0	424.0	522.0	653.0	800.0	985.0	1894.0	3674.0

Table III—Other Kinds of Wire, AWG

DISTANCE, FT.	HTC-80			CU WELD			ACSR		3S130
	8	6	4	8	6	4	4	2	6
100	7.4	11.2	15.4	4.6	7.3	11.6	6.7	9.2	11.2
200	14.7	22.4	30.8	9.1	14.6	23.2	13.5	18.3	22.4
300	22.1	33.6	46.2	13.7	21.8	34.8	20.2	27.5	33.6
400	29.4	44.8	61.6	18.2	29.1	46.4	27.0	36.6	44.8
500	36.8	56.0	77.0	22.8	36.4	58.0	33.7	45.8	56.0
600	44.1	67.2	92.4	27.3	43.7	69.6	40.4	55.0	67.2
700	51.5	78.4	107.8	31.9	51.0	81.2	47.2	64.1	78.4
800	58.8	89.6	123.2	36.4	58.2	92.8	53.9	73.3	89.6
900	66.2	100.8	138.6	41.0	65.5	104.4	60.7	82.4	100.8
1000	73.5	112.0	154.0	45.5	72.8	116.0	67.4	91.6	112.0

Having determined the weights for the various kinds of conductors, the approximate conductor material and labor costs can be determined from the fourth table.

Material costs can be adjusted for changes in prices.

Labor costs for estimating are intended to cover storeroom handling, shrinkage, transportation and installation; no supervision included.

DATUM COSTS IN DOLLARS

Table IV—Cost of Material and Labor

WEIGHT, LB.	MATERIAL				LABOR			
	Copper	Steel	Cu Weld	ACSR	Copper	Steel	Cu Weld	ACSR
10	1.60	0.55	1.88	1.91	0.40	0.35	0.38	0.55
20	3.20	1.10	3.76	3.82	0.80	0.70	0.76	1.10
30	4.80	1.65	5.64	5.74	1.20	1.05	1.14	1.65
40	6.40	2.20	7.52	7.65	1.60	1.40	1.52	2.20
50	8.00	2.75	9.40	9.56	2.00	1.75	1.90	2.75
60	9.60	3.30	11.28	11.47	2.40	2.10	2.28	3.30
70	11.20	3.85	13.16	13.38	2.80	2.45	2.66	3.85
80	12.80	4.40	15.04	15.30	3.20	2.80	3.04	4.40
90	14.40	4.95	16.92	17.21	3.60	3.15	3.42	4.95
100	16.00	5.50	18.80	19.12	4.00	3.50	3.80	5.50

Note: Table for estimating purposes only. Price level: copper at $0.16 per lb., iron at $0.055 per lb., ACSR at $0.191 per lb., Copperweld at $0.188 per lb. As price level changes, add or subtract percent difference to prices in table.

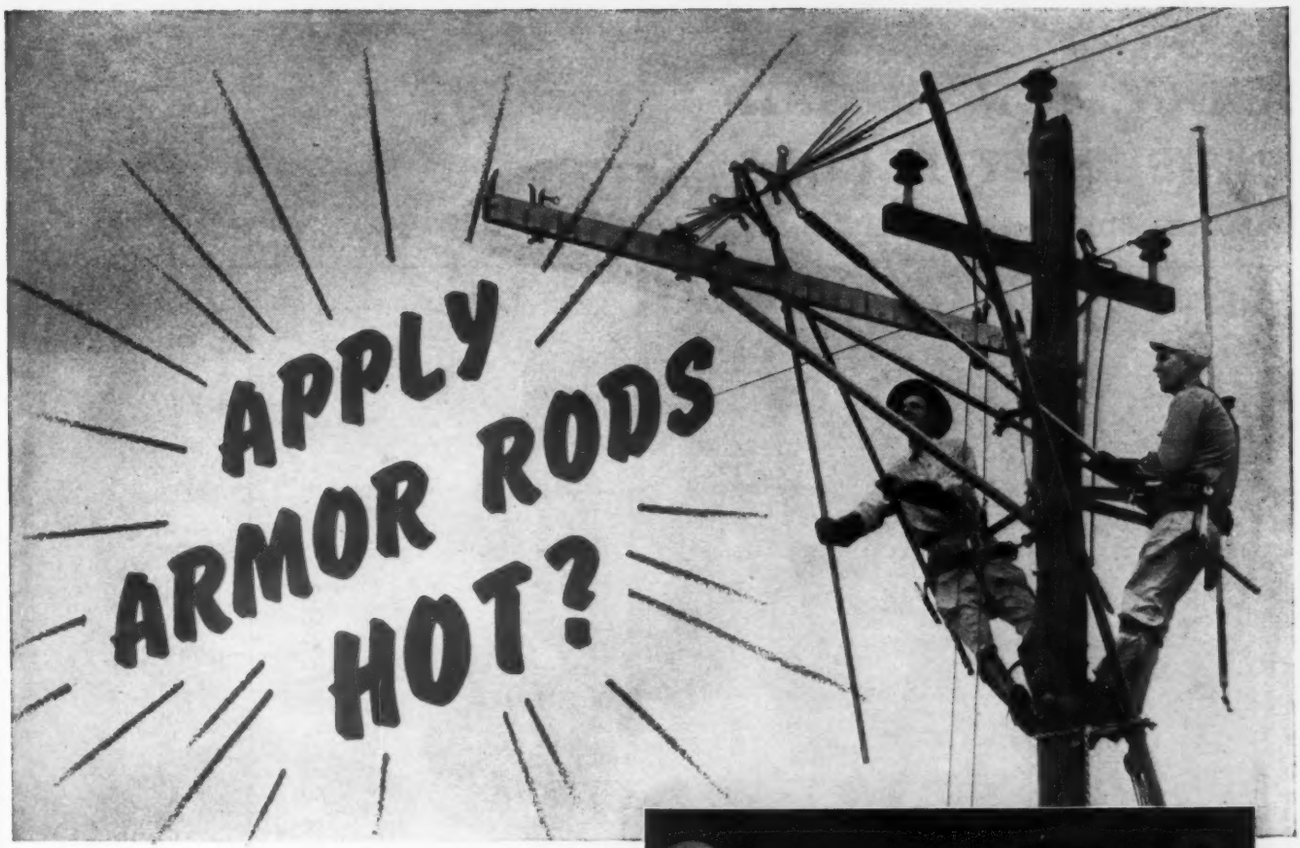
DESIGNATIONS USED IN TABLES

HTC—80 = **High Tension Galvanized Steel Solid Conductor; "Crapo" HTC 80 (Indiana Steel & Wire Co.).**

Cu Weld = **"Extra High Strength" Solid Copperweld Bare Wire.**

ACSR = **Aluminum Cable Steel Reinforced Stranded Conductor.**
No. 4 ACSR has seven strands of aluminum (0.0772-in. dia. each) and one strand of steel (0.1029-in. dia.).
No. 2 ACSR has six strands of aluminum (0.1052-in. dia. each) and one strand of steel (0.1052-in. dia.).

3 S 130 = **3-Wire High Tension Zinc-Coated Steel Stranded Conductor.**



These TIPS Tools do the Job Quickly-Safely

This Tips Tool equipment provides a simple, practical method of applying armor rods hot—without service interruptions. The tool set can be used with all standard sizes of armor rods for cable ranging in size from No. 4 ACSR to 266,800 CM—ACSR.

The application is simple. Dies are inserted in holder frames and armor rods are threaded through dies. The illustration at lower right shows assembled unit ready to be placed over the conductor. After being placed on the line, the eye screws are turned up with clamp sticks to close the die. The newly-designed die holder frames, which eliminate the need of special hooks or tools, are turned with ordinary disconnect sticks, one clockwise and the other counter-clockwise, until center of span is twisted. Holder frames are then moved to the ends of the span and the twisting is continued until job is completed, after which frames are removed from line. Clips are applied by a special device designed to hold armor rod clamps, and nuts are cinched with a hot line wrench.

The die holder frames are made of heat-treated cast aluminum for combined lightness and strength. They fit all Aluminum Company of America dies for C size wrench frames.

More complete details will be sent upon request.

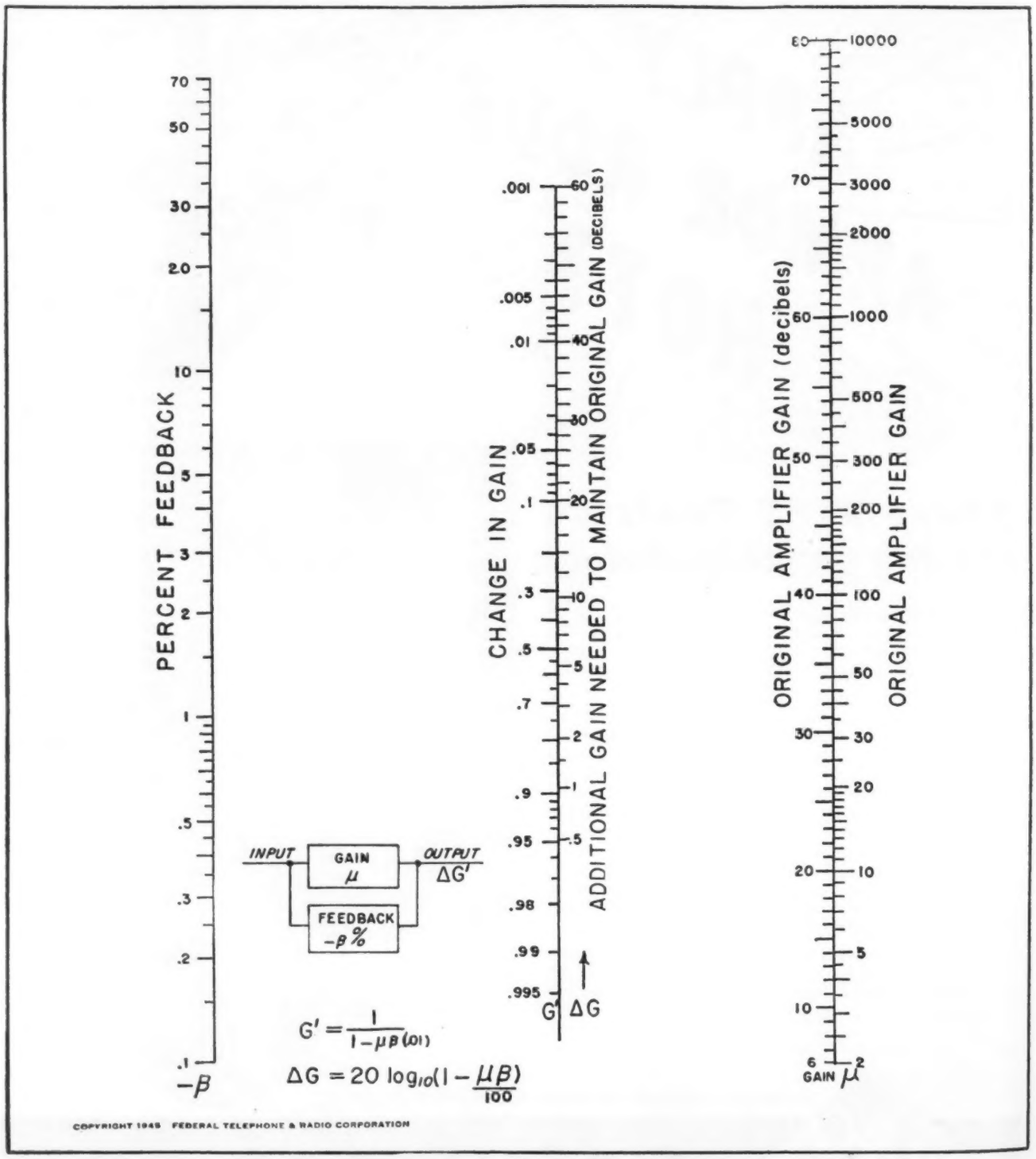
"THERE'S NOTHING TOO GOOD WHERE LIFE IS AT STAKE"

ABC INDUSTRIES

A·B·CHANCE CO·
CENTRALIA, MISSOURI.

REDUCTION IN GAIN CAUSED BY FEEDBACK

N. MARCHAND, Engineer, Federal Telephone & Radio Corp., New York

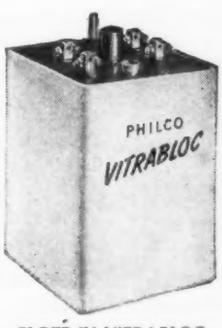


In negative feedback amplifier considerations β (expressed as a percentage) has a negative value. A line across the β and μ scales will intersect center scale to indicate change in gain resulting. It also indicates amount (in decibels) by which input must be increased to maintain original output. Original amplification may be expressed as voltage ratio or in decibels by using appropriate scale at right.

More Power for More Lines!

Expanded utility service, long retarded by the war, calls for substantially increased battery capacity for control and auxiliary power. In providing this specialized equipment, Philco Storage Battery engineers stand ready to serve you at every stage of planning, engineering and installation. Only Philco offers you control batteries specifically designed for modern full float service—the famous Philco Floté Batteries that eliminate low cells and materially reduce operating costs. Only Philco Floté Batteries are available in all types of glass, rubber and Vitrabloc jars. Write for latest specification data. Specify Philco. PHILCO CORPORATION, Storage Battery Division, Trenton 7, New Jersey.

FLOTÉ IN GLASS



FLOTÉ IN VITRABLOC

FLOTÉ IN RUBBER

PHILCO

FOR 50 YEARS A LEADER IN STORAGE BATTERY DEVELOPMENT

Crane on Truck Eases Transformer Handling

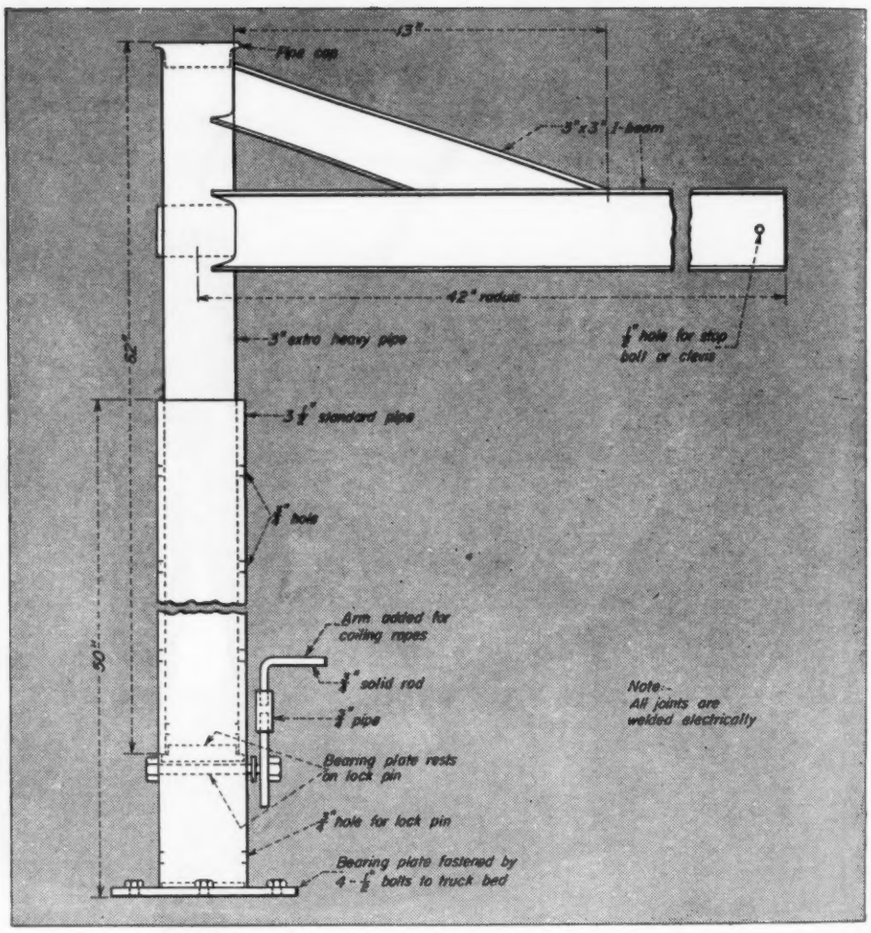
ERNEST J. MILLER
Line Foreman, Toledo Edison Co.
Toledo, Ohio

INSTALLATION of a swing crane on a line truck has eliminated much manual operation for a line crew, has been a safety factor in their work and requires small space on the truck. The crane was designed by the author and constructed and installed by the garage department of the Toledo Edison Co.

While the crane was developed originally for the purpose of lowering or raising transformers to and from the ground and for placing them in desired place on the truck, it has also proven a time and labor saver in handling and mounting coils and reels of wire. And from a safety standpoint, the crane has been used for operations that previously had to be done by manpower using crude and unsafe methods. It has handled a 75-kva. transformer (approximately 1,250 lb.) from the ground to deck of the truck.

Installation of the crane is at the right rear end of the truck. Vertical member or two-part frame consists of a 3½-in. diameter pipe mounted on the truck bed and serving as a fixed part into which fits a 3-in. diameter pipe with a swing arm. The fixed or stationary section has several 3/4-in. holes in which is inserted a pin for adjusting the height of the movable section. The swing arm of 3-in. x 3-in. I-beam has a radius of 42 in. and carries a trolley. To the trolley can be hooked a pulley for use with a hand line and winch, or block and tackle or some other kind of hoisting device.

When the crane is not in use it requires practically no space on the truck. Since the two-part frame is telescopic the movable section is lowered, the trolley is removed, the arm is rotated until it is parallel with the exterior of the right side of the truck body, and then the movable section is locked in place with a pin.



TRUCK CRANE in working position, resting on pin which is inserted to adjust height of swing arm. It requires little space on the truck

SWING CRANE with trolley and one form of hoisting gear

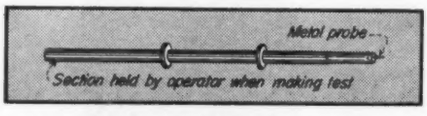
• • •

Neon Light Verifies Deenergized Circuit

BEFORE starting work on circuits, especially cables with switching at remote points, it is imperative that all clearance procedure rules be observed and that, in addition, a test for potential be made on the conductors. For this purpose an East Coast utility uses the customary neon light but in a tool that not only has wide range of voltage applicability but has the light so shielded from the sun that there can be little doubt whether it is indicating or not.

The device shown in the accompanying illustration is about 4 ft. long and consists of two dilecto tubes, the inner one having an outside diameter of $1\frac{5}{16}$ in. and the outer having an outside diameter of $1\frac{5}{8}$ in. These tubes provide the necessary insulation for the operator and also act as a light shield for the neon lamp so that the device may be used without difficulty in direct sunlight. Between the two cylinders is a copper foil cylinder about 4½ in. long which provides the desired capacitance effect.

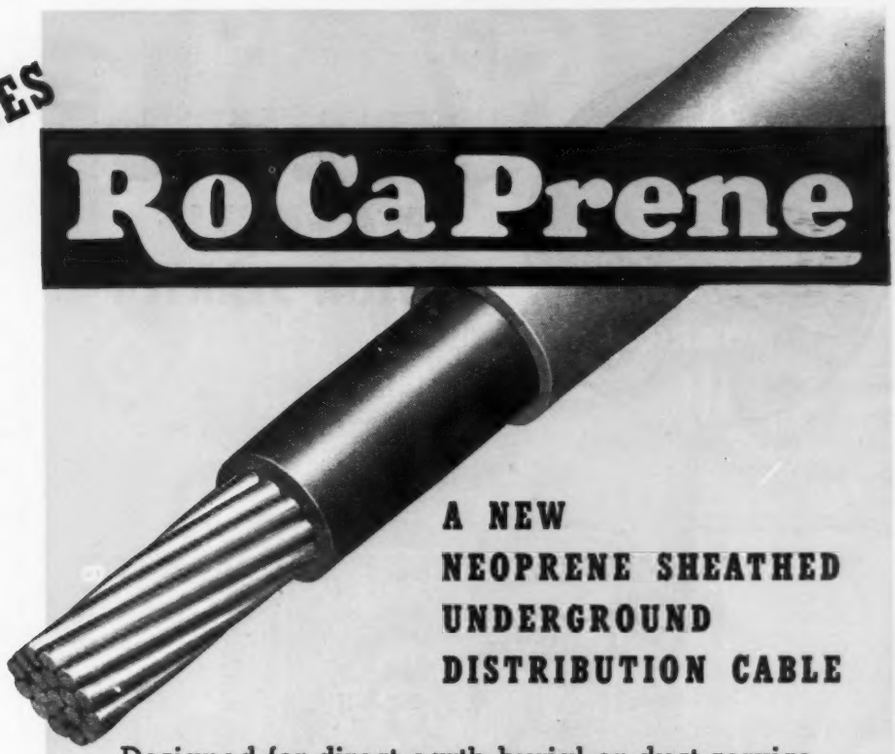
Two dilecto rings on the outer tube



CAPACITIVE double-shell tube shields neon tube from daylight when energized by live conductors

ROMEY ANNOUNCES

RoCaPrene



A NEW NEOPRENE SHEATHED UNDERGROUND DISTRIBUTION CABLE

Designed for direct earth burial or duct service RoCaPrene has been developed by Rome Cable and is offered as a distinct improvement over existing types of braided or metallic sheathed cables.

A new insulating compound provides excellent electrical stability, superior moisture resistance and high current-carrying capacity.

The protective sheath is Neoprene . . . the time tested non-rubber compound used extensively as jacket material to provide great resistance to heat, abrasion, oils, acids, alkalies, and solvents.

Rome Cable recommends the superior electrical and mechanical properties of this new composite cable for underground distribution circuits, transformer leads, pole riser cable, station auxiliaries, and industrial service.

AND . . . A NEW PLANT

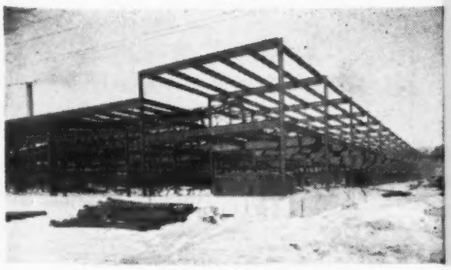


Photo shows steel work for our new addition.

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

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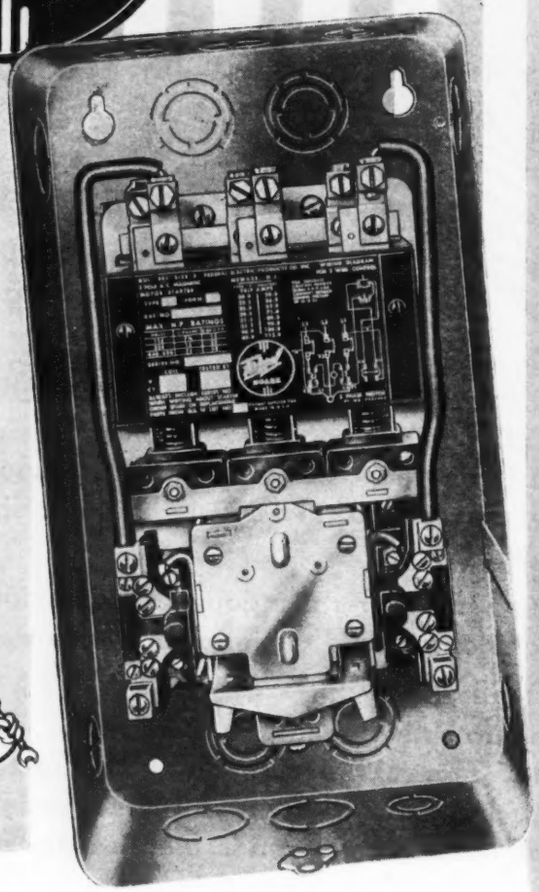
Federal
NOARK

SIZE 3
MAGNETIC
MOTOR STARTER



For man-size jobs of stop-and-go
Without a bit of care or woe
This starter really fills the bill . . .
A fine example of Federal's skill!

Sets a new standard of ease and speed in replacement of any stationary or moveable contacts. Coil replacement in a few seconds without disturbing line or load connections. Greater compactness, yet more ample wiring space. Silver contacts on all current interrupting points. Exclusive vertical ball-bearing operation for highest speed solenoid action. Overload relays, combination hand or automatic reset, for dependable protection.

FEDERAL ELECTRIC PRODUCTS COMPANY, INC.
EXECUTIVE OFFICES: 50 PARIS ST., NEWARK 5, N. J. PLANTS: HARTFORD, CONN. NEWARK, N. J.

support the device in a carrying case and also prevent the operator from holding the device improperly when making a test.

The proportions of the device are such that it is feasible for use from 200 volts to 15 kv. Test procedure includes checking the device on a live circuit of same voltage as circuit being cleared both before and after the test on this circuit.

This tool has proven to be a real safety aid in situations where hazards lurk because of the multiplicity or complexity of the circuits, or where a possibility exists of accidental contact between the circuit on which clearance is desired and some energized circuit.

•

High-Frequency Heat Cures Foamex Products

A HIGH-SPEED production line installation for electronics curing and drying of foamed sponge rubber (Foamex) for automobile and airplane seat cushions, furniture upholstery, mattresses and other post-war products has been placed in production in the plant of the Firestone Tire & Rubber Co. at Fall River, Mass.

For the operation of dielectric heating, power is supplied by a Westinghouse generator rated at 125 kw., 13.6 megacycles. The power is delivered through plates or work electrodes which form the top and bottom sections of each work-handling chamber, which cures and dries the rubber.

Moulds full of liquid rubber, which has been beaten to a foam, are delivered to the work chamber by conveyor lines. As they come to rest in the chamber, current is turned on either manually or automatically, the latter by closing the chamber door.

After this treatment the moulds are removed through the opposite door and h-f power is applied to the adjoining work-chamber loaded while work in the first chamber is being treated. Cured forms are carried away by a second conveyor.

Cured rubber when removed from the moulds is subjected to a second charge of h-f heat. This is a very brief charge and moulded rubber is then removed from the work-chamber and placed on a slow-moving conveyor which carries it through a hot air drying tunnel.

Typical time economies follow. Preheating of uncured material prior to

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They're Built to Spend *LESS TIME IN THE SHOP!*

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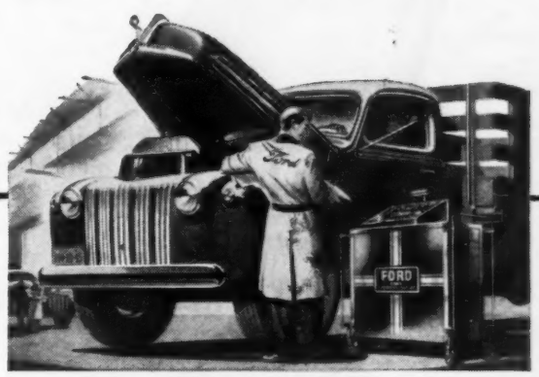
Your trucks can earn money for you *only* when they're on the job. Ford Trucks are engineered for extra endurance. They're tough, sturdy and renowned for reliability. *They stay on the job!*

And when your Ford Truck *does* need service, the time and cost are usually less, because a Ford Truck is easy for a man to work on. The nation-wide Ford Dealers' Parts Exchange Plan, too, saves you time and money on unit-assembly replacements.

Wherever your trucks travel, in big towns or small, you'll find economical Ford service, with trained men and ample stocks of genuine, sure-fitting Ford parts. Ford truck service is geared to cut "off-the-job" time, keep your trucks on the road and protect your delivery schedules.

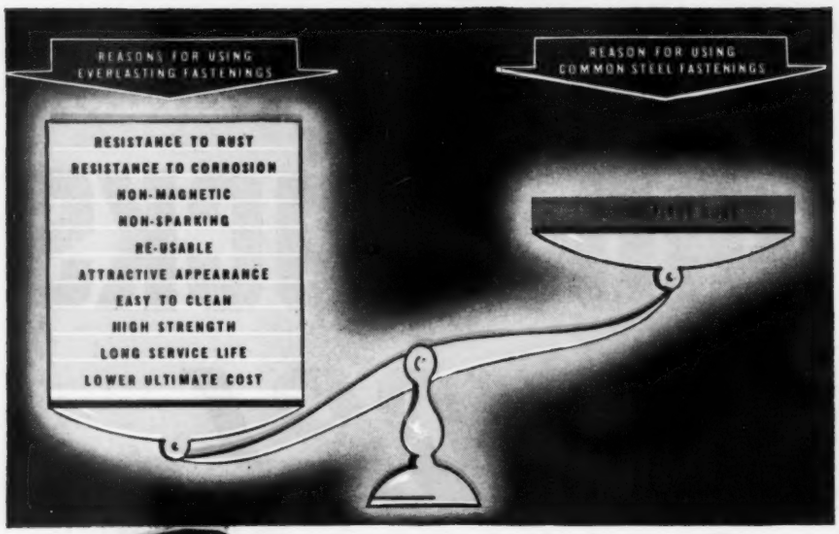
Doesn't it strike you that such a line-up of extra value merits a call on your Ford Dealer soon?

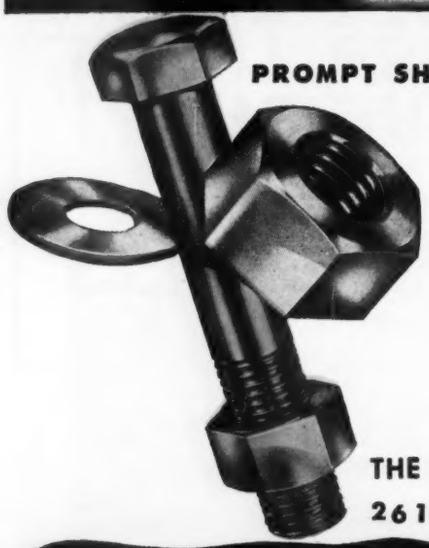


FORD TRUCKS

10 to 1 IN FAVOR OF EVERLASTING FASTENINGS

Here's the score. 10 or more reasons for using everlasting fastenings . . . just 1 for common steel. An amazing combination of advantages in favor of non-ferrous and stainless bolt and nut products . . . only lower first cost in favor of common steel. Check the list against your own fastening requirements. Write us for details.





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molding has cut the molding cycle in half. The combination drying is another big saving since seat cushions can be dried by a 1-min. electronic treatment and then one hour in the drying tunnel, in comparison to twelve hours in the old steam oven.

•

Underground Vault Water Alarm

A. A. STRAUB,
Substation Engineer
Southern California Edison Co.
Los Angeles, Calif.

NEED for a high-water alarm system for its underground vaults and one that could be used to indicate the particular vault led Southern California Edison Co. to develop the scheme shown in the accompanying diagram. It operates on the principle of using a milliammeter to measure the resistance of the circuit to the vault whose float switch has been closed due to high water. Calibrations on the milliammeter in 10-ma. steps from 40 to 200 indicate vault numbers. Each vault after the first has a variable resistance in series with the float switch that is adjusted to make the milliammeter

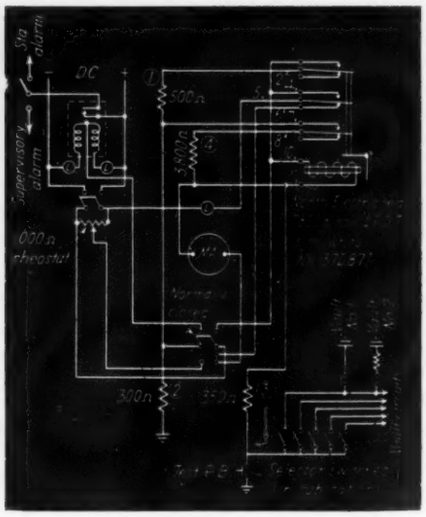


DIAGRAM for high water and transformer temperature alarm and vault selector circuit. After an alarm the DPDT switch is thrown to lower position to connect the vaults. Vault circuit selector switches should then be opened to identify the source of the alarm. With the selector switch of this circuit only closed, read the milliamperes on the meter to identify the vault that is in trouble

THOMAS "QUIET-TYPE" INSULATORS

UTILITY EXECUTIVES — alert to the public demand for noise-free radio reception, are instructing their Engineers to install noise-free insulators on all new construction.

UTILITY ENGINEERS — after careful consideration of all methods of combating radio interference, are choosing Thomas "Quiet-Types" for permanent elimination of insulator radio-noise.

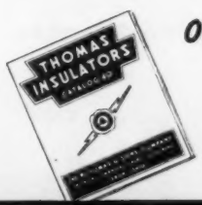
. . And here are the REASONS WHY!

● All Thomas "Quiet-Types"—Switch or Bus, Suspension-Strain, and Pin Types are guaranteed noise-free and each incorporates the Thomas patented "Under-Glaze Process."

● Combined with our under-glaze, noise-eliminating process, which is a definite plus value, the user of Thomas "Quiet-Types" gets an insulator of time-tested design whose performance is unexcelled for reliability.

● Noise-free characteristics of Thomas designs were so carefully developed they do not impair the insulator's desirable features as an insulator; and the Thomas "Under-Glaze Process" does not in any way harm the porcelain structure but maintains electrical, thermal, and mechanical characteristics at the highest degree of perfection.

● The slight additional cost over conventional type insulators is relatively speaking your best investment when customer goodwill is maintained by the quiet operation of your lines. Thomas "Quiet-Types" cost you no more than similar insulators—install them today for better service. They're backed by 68 years of manufacturing experience.



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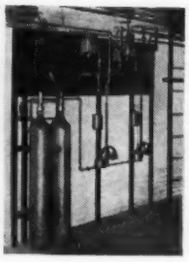
OUR 73rd YEAR

Consider these questions for a moment: If you have vaults for filing tracings, blue prints or other valuable records; storage spaces where highly flammable liquids and chemicals are kept; bake ovens, dip tanks, spray booths, and electrical equipment—and a serious fire occurs, how long would you be out of production? How much damage would irreplaceable records and other materials suffer from improper extinguishing agents or methods? If the answers suggest a survey of your present fire protection then consider these facts:

C-O-TWO smoke detecting combined with fire extinguishing is new—modern. The slightest trace of smoke is detected instantly. This new C-O-TWO protection is not dependent upon heat. It operates instantly on the detection of smoke. C-O-TWO pressure release will automatically close doors and windows—isolating a fire. Dry sub-zero carbon dioxide gas from a C-O-TWO built-in system will extinguish a fire in seconds without damage to materials or machinery.

Portable extinguishers including the famous C-O-TWO Squeez-Grip valve—wheeled units or hose reel types, afford additional protection against incipient fires. All employ carbon dioxide, the fastest non-damaging fire extinguishing agent. C-O-TWO engineers will help you plan modern fire protection. Write for information.

C-O-TWO Detects Smoke . . . Kills Fire
Saves Lives . . . It's Fast . . . It's Modern



C-O-TWO FIRE EQUIPMENT COMPANY

Newark 1, New Jersey

AFFILIATED WITH PYRENE MANUFACTURING COMPANY

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readings fall on even ten divisions. These range from 2,000 ohms to zero. This is to differentiate easily between the 17 vaults.

All eleven-pair, No. 19 lead cable is installed in a spare duct for operation of the alarm and also for telephone communication to vaults. More recently, transformer temperature indication has been added by installing a second set of contacts in each vault as shown. As many as 17 vaults are placed on a single wire in the control cable. Adjacent vaults are placed on different wires to avoid the possibility of two danger signals coming in simultaneously on the same wire and not being able to determine by operation of the selector switches and the milliammeter reading the vault in trouble.

It might be noted by way of explanation that on the Edison system flameproof cable is used on transformer secondaries so that adjustable reactors may be installed to share load between transformers. It is, therefore, necessary that vaults have a high-water alarm.

•

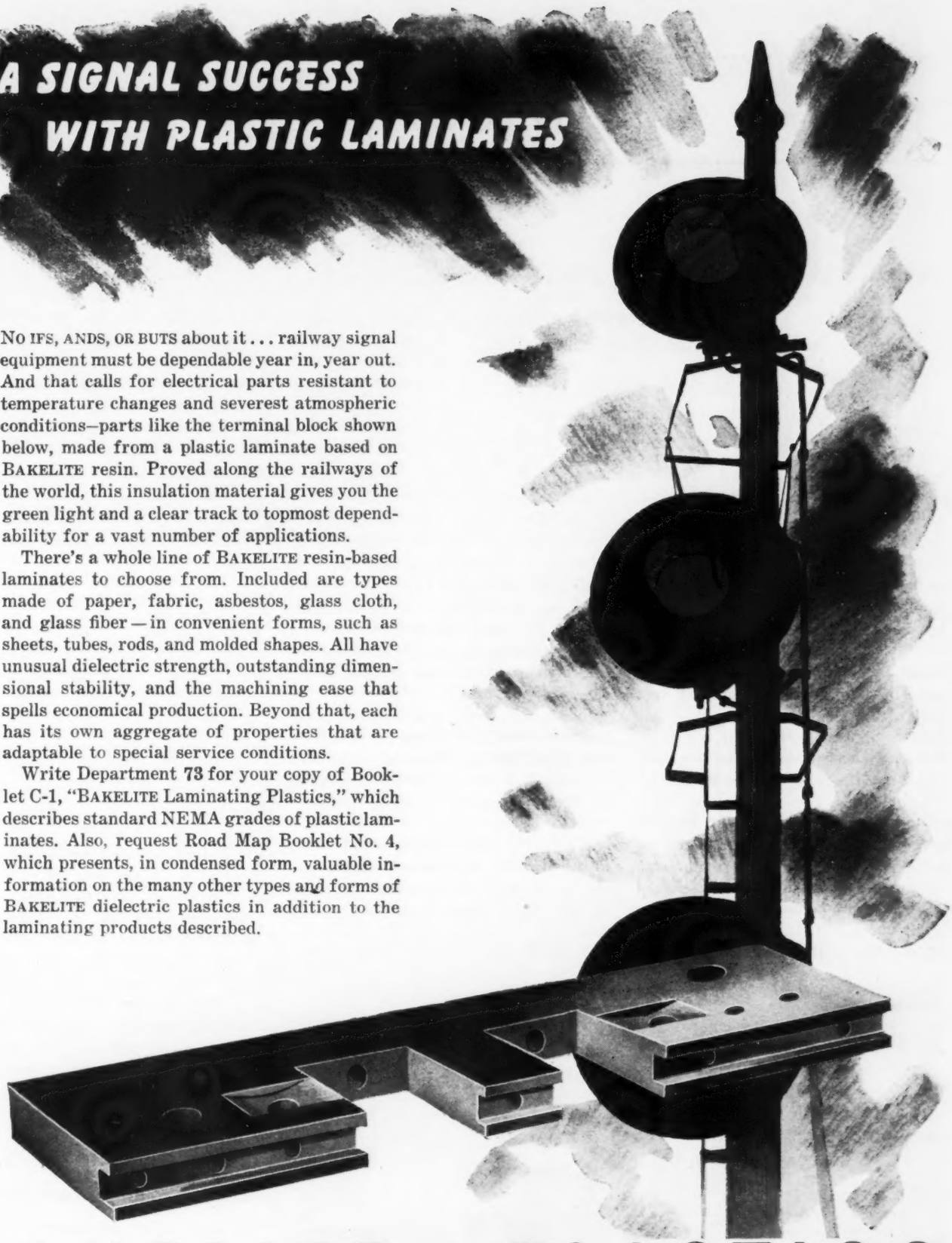
Spring Holds Converter Rheostat Switch Open

Two and three-pole, double-throw knife switches used for the control of field rheostats on rotary converters can be turned into automatic watchdogs against operator carelessness with a spring recently put into use by the Consolidated Edison Co. of New York, Inc. Submitted to the company's suggestion committee, the device won an award for its inventor, B. H. Schwarz, of the substation operation department.

With proper maintenance, the company has found, there is little danger that such a switch will fall from its open or vertical position to a closed position. But experience has shown that field control type converters have been damaged by flashover because an operator accidentally left the field rheostat control switch in a closed position, causing the converter to invert.

The spring now in use by Consolidated Edison is mounted on the central pivot of the switch so as to produce a torque against the knife blades whenever they move from the vertical position. To keep the switch closed, the operator must maintain a manual grip on the handle. When the grip is released, the spring returns the knife blades to a vertical position.

A SIGNAL SUCCESS WITH PLASTIC LAMINATES



NO IFS, ANDS, OR BUTS about it . . . railway signal equipment must be dependable year in, year out. And that calls for electrical parts resistant to temperature changes and severest atmospheric conditions—parts like the terminal block shown below, made from a plastic laminate based on BAKELITE resin. Proved along the railways of the world, this insulation material gives you the green light and a clear track to topmost dependability for a vast number of applications.

There's a whole line of BAKELITE resin-based laminates to choose from. Included are types made of paper, fabric, asbestos, glass cloth, and glass fiber—in convenient forms, such as sheets, tubes, rods, and molded shapes. All have unusual dielectric strength, outstanding dimensional stability, and the machining ease that spells economical production. Beyond that, each has its own aggregate of properties that are adaptable to special service conditions.

Write Department **73** for your copy of Booklet C-1, "BAKELITE Laminating Plastics," which describes standard NEMA grades of plastic laminates. Also, request Road Map Booklet No. 4, which presents, in condensed form, valuable information on the many other types and forms of BAKELITE dielectric plastics in addition to the laminating products described.

BAKELITE PLASTICS

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TRADE-MARK

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LOAD BUILDING

Better Light and Better Health in This Schoolroom

L. E. WEBER
Metropolitan Edison Co., Reading, Pa.

NOWHERE in a properly lighted schoolroom should there be any areas or surfaces materially brighter than others; illumination should be as nearly uniform as possible. On this requirement a schoolroom fixture was designed and produced locally by the East Penn Engineering Co. of Reading. The fixture comprises positions for six 40-watt fluorescent tubes, one or two of which may be replaced by germicidal lamps, arranged three across, two lengthwise, set in a V-trough of translucent glass open at the top. This results in a long, narrow unit of very low surface brightness and with strong light component upward for ceiling reflection. There was the fixture; now was wanted a place to try it out.

Came now the sight-saving committee of the Lion's Club of Muhlenberg Township, near Reading, looking for a project to foster. A room in an old grade school building was selected by the committee and approved by the local school board. The exposure was toward the north, there were blackboards on three sides, wood-work and walls were dark, and the lighting from bright enclosing globes gave 6 footcandles on varnished desks. This dull prospect for the student mind was completely changed.

The floor was brought up to a natural finish, the walls were given two coats of ivory, and the ceiling covered with white, washable paint. The woodwork was finished in two tones of light green. The rear blackboard was removed to give the pupils in this area the benefit of a wall having high reflectivity.

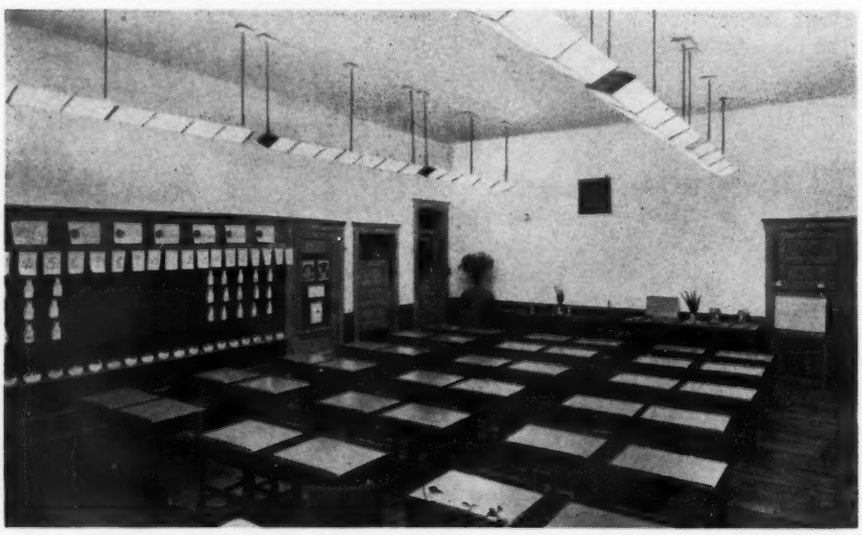
The fixed desks were replaced by movable chairs and tables in less than semi-gloss finish, blending with the woodwork. These are placed at angles to the windows, or in groups as class work requires.

Six of the new lighting units were installed with shock-absorbing hangers to reduce vibration and jarring of tubes and starters in the units caused by classes on the second floor. The inside row of three fixtures has eighteen 40-watt tubes with photocell control to maintain illumination automatically. The outside row has twelve tubes with a 30-watt germicidal lamp mounted in the center of each of the three units. The germicidal lamps are on a separate circuit, operating all day. This installation provides 40 footcandles at desk surfaces and 25 footcandles on the blackboards.

In this installation the germicidal lamps were incorporated in the lighting units to irradiate the upper portion of the room; the cutoff is 6 ft. above the floor. With this arrangement, the equivalent sanitary ventilation is approximately 90 air-changes per hour, which greatly exceeds the number of mechanical air-changes required to secure much less effective results.

Maintenance of fixtures was not overlooked, as tubes and glass panels can be removed independently, without tools, and easily cleaned. Mounting of ballasts in groups of three in the ceiling above the units reduces transformer hum and gives a lighter and safer fixture. Convenience outlets were placed at front and rear of room for operating visual education aids.

The success of this experiment was evidenced by the favorable reaction of all who inspected the room during "Open House" and by the attitude of the pupils toward their work. The Lion's Club committee was particularly gratified when the township school board decided to modernize an entire grade school building soon after the first installation was accepted.



MODERN lighting for the township school; germicidal lamps incorporated

•

Enlarging Service Entrances

TO INSURE adequate entrance wiring when residential customers add appliances, the Hartford Electric Light Co. recently established a program to accomplish this without burdening home owners or tenants. Present minimum requirements for normal service call for a 3-wire, No. 6 circuit from the transformer secondary or 115/230-volt

visual sales aids do the job. There's Seymour's color movie. A color slide film. Salesman's easel. Booklets and direct mail. All carefully designed to present a convincing picture of the benefits of modern 1-3-5-10 store lighting.

SPECIFICATION GUIDE! Have your salesmen carry G-E's new handbook, "The Three A's of Store Lighting," with them and have the answers to specification problems at their fingertips. Fits the pocket. Contains simplified store lighting layout and design.

FINANCING! No need to let financing problems kill the sale! G-E has worked out special financing plans for every type of lighting installation.

MAINTENANCE! And don't forget that neither the retailer nor the industry gets full benefit from modern "sales lighting" unless the installation is well maintained. For this purpose, the G-E Certified Lighting Service has been created.

SALES TRAINING! Bring your salesmen up-to-date on "know-how." G-E's new training program was prepared in cooperation with LaSalle Extension University to give salesmen a sound knowledge of lighting and salesmanship. Adaptable both to individual and group instruction. Even experts find it worthwhile!

THERE IT IS — everything you need to sell store lighting, boiled down to six basic essentials. So let this program go to work for you. See your General Electric lamp representative now.

Seymour!

G-E LAMPS

Constantly improved by research to

Stay Brighter Longer!

GENERAL ELECTRIC

mains to the meter panels in one, two and three-family houses. In a few cases affected by war conditions, 2-wire services had to be installed; but these are not typical of the system.

The necessary increase in service wiring capacity is financed by the Hartford company from the secondary mains to the meter, and about 100 such installations have been made in three months. A change to No. 4 wire generally suffices. This provides for the requirements of an electric range in each apartment of a 3-family house. A range can be installed in one such apartment or tenement without change from No. 6 wire, but the larger size conductor is required for two or three ranges. The wiring from the meter to the range is provided by the customer in each case. In a 3-family layout where the meter board is remote from the service entrance, the No. 4 3-wire service is run to a 100-amp. main switch inside the house and thence to the meter board, where three 60-amp. switches are installed. The meter board is prepared for the installation of three ranges at any time. The company bears the cost of the switches. If the meter board is close to the entrance point, the three 60-amp. switches suffice. Voltage regulation and general service quality gain by this program.

• • •

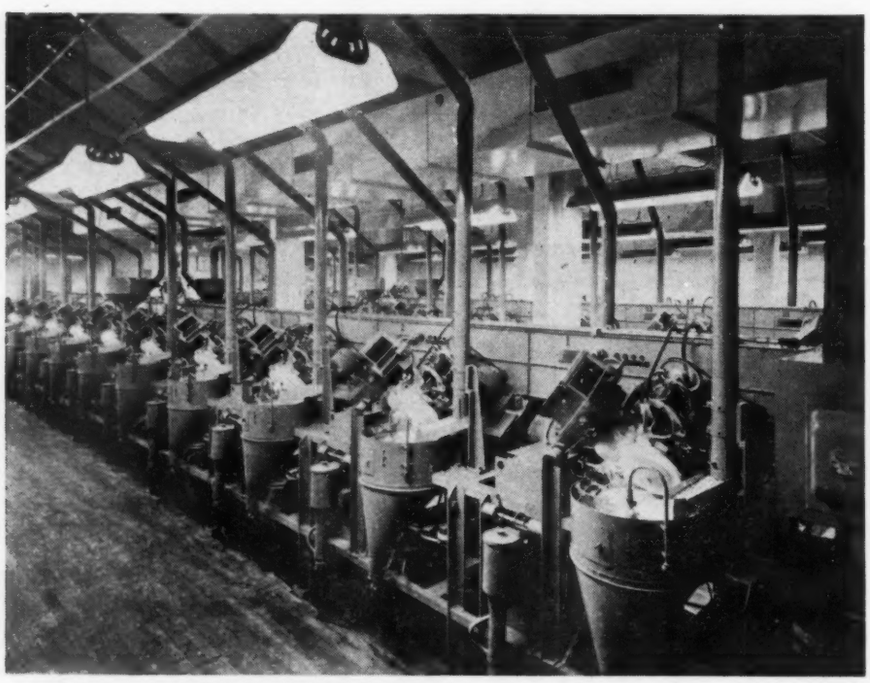
700 Tons of Food Sorted Daily by Electron Tubes

THE FELLOW who says "it doesn't amount to a hill of beans" has never tried to sort one. Otherwise, he'd know that a hill of beans is nothing trivial. But aided by one of the growing industrial uses of electron tubes, the formerly tedious task becomes speedy, foolproof, and automatic.

Equipped with a couple of phototubes for eyes and a cathode-ray tube for a brain, the electronic sorting machine, according to the tube division of the Radio Corp. of America, "looks" at each bean individually and separates the good ones from the bad ones much faster and more accurately than could human sorters.

Approximately 1,000 of these "super sorters," manufactured by the Electric Sorting Machine Co., of Grand Rapids, Mich., are now sorting about one and one-half million pounds of food each day in plants from California to Virginia and in Canada. Each installation consists of at least 16 machines. The foods include beans of various kinds, seed corn, peanuts, coffee, and even potatoes.

This type of installation has met the test of years of practical experience, an installation having been made as early as 1931 at the Grand Rapids plant of the C. H. Runciman Co. A. G. Curtis, president of the Electric Sorting Machine Co. reports that the average life of RCA electron tubes used in this installation has been estimated at more than 8,800 hours.



VIEW of portion of the plant of the Michigan Bean Co., Saginaw, Mich., showing a bank of electronic sorting machines separating unacceptable beans from good ones on the basis of their color quality; tube life more than 8,800 hours

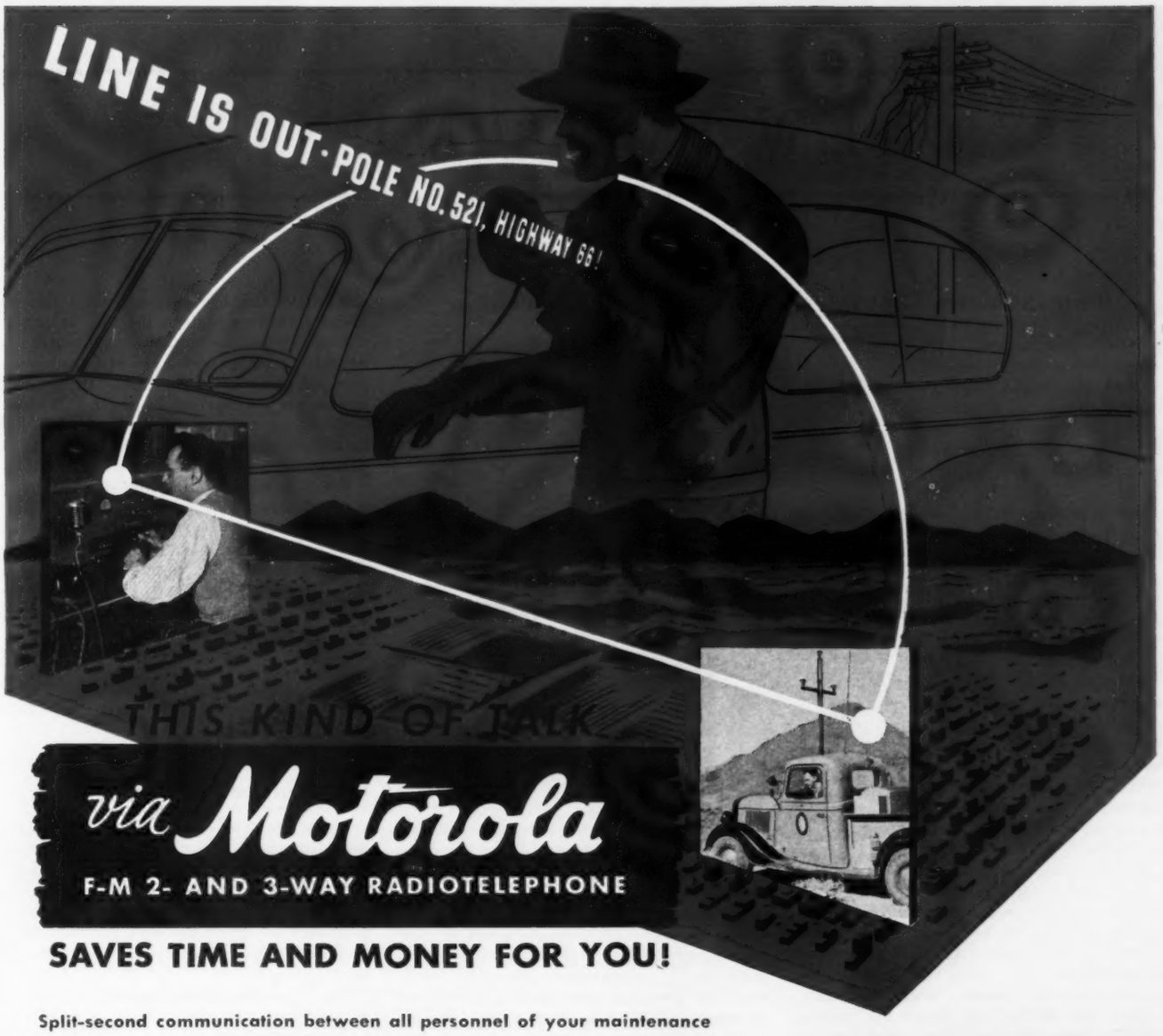
Optical System

In the sorting of beans, acceptance or rejection of each one depends on the respective percentages of red and green light reflected by it. The mechanical design of the machine provides for feeding the beans, one at a time, through an optical system consisting of an incandescent lamp, a focusing lens, two mirrors, and two phototubes.

Light from the lamp is reflected by the bean through the lens to the first of the two mirrors. This mirror is what is known as a "partial" or "50-percent" mirror. It reflects part of the light through a red color filter to the first phototube, but transmits another part of the light to the second mirror, which reflects it through a green color filter to the second phototube. The first phototube is especially sensitive to red light, and the second tube is sensitive to green light.

The output of each phototube is amplified and fed to one of the two pairs of deflection plates of a cathode-ray tube. This permits one phototube to control the horizontal sweep of the electron beam in the cathode-ray tube, while the other phototube controls the vertical sweep of the beam. The degree to which the beam is deflected in either direction is governed by the respective amounts of red and green light reaching the phototubes.

A partial mask covers that part of the face of the cathode-ray tube on which the electron beam will appear when controlled by the color range of an acceptable bean. When a bad bean passes through the optical system, the color of the reflected light affects the output of the phototubes, and this in turn alters the sweep of the electron beam so that it appears outside the mask. Any position of the electron beam outside of the masked area actuates a third phototube whose output is amplified to operate an ejector mechanism which rejects the faulty bean.



via Motorola

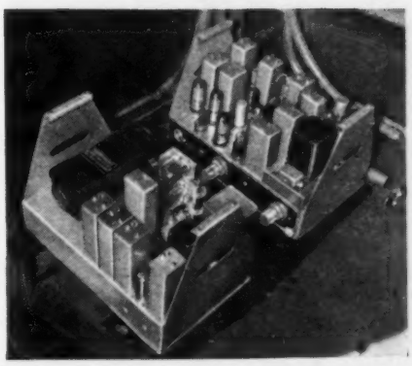
F-M 2- AND 3-WAY RADIOTELEPHONE

SAVES TIME AND MONEY FOR YOU!

Split-second communication between all personnel of your maintenance department means greatly increased efficiency throughout your entire system. No time is lost by repair crews waiting for instructions by telephone, or in reporting back between jobs. Fewer Patrol cars and repair cars are necessary when their efficiency is increased with Motorola Radiotelephone. So the initial cost of the equipment is quickly balanced by the savings in time and maintenance.

WHEN YOU DECIDE ON RADIOTELEPHONE—CHOOSE MOTOROLA!

Motorola dependability has been *proved* time and again! The California Electric Power Co. uses Motorola equipment exclusively for line patrolling. Police of 34 states and over 1,000 communities rely on Motorola for emergency communications. Ask us to submit specific recommendations on the application of Motorola Radiotelephone in *your* system. There's no obligation, of course—WRITE TODAY!



One of the many types of Motorola mobile units for use in patrol cars, repair cars, etc. (Shown with dust covers removed.)

GALVIN MFG. CORPORATION • CHICAGO 51

COMMUNICATIONS AND ELECTRONICS DIVISION

F-M & A-M HOME RADIO • AUTO RADIO • PHONOGRAPHS • TELEVISION • "HANDIE TALKIES" • POLICE RADIO • RADAR • MILITARY RADIO

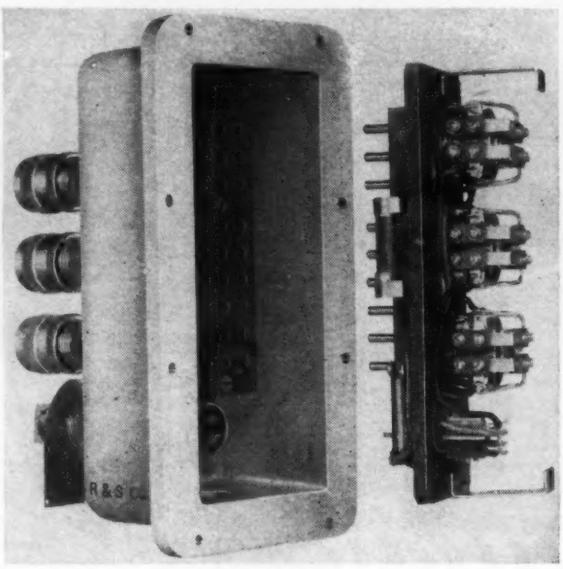
NEW EQUIPMENT

Plug-in Alarm Unit Provides Continuous Supervision

NEW standardized unit alarm system for the supervision of equipment and process operations is being announced under the trade name "Unilarm" by the Russell & Stoll Co., 125 Barclay St., New York 7, N. Y. The report states it provides in one compact enclosure the essentials of complete supervision.

All contact-making devices are assembled on a plug-in type panel which is easily removable for relay adjustments. A replacement unit may be inserted immediately to insure continuous alarm protection.

Standard circuits have been adopted to provide independent operation of each "Unilarm." As many units as required may be installed with a common howler circuit without the possibility of feedback.



In operation, indicator lights of different colors give continuous or flashing visible signals and the alarm control causes the howler or gong to be sounded when conditions become abnormal. The operator acknowledges the alarm by turning the acknowledgment switch which, in turn, silences the howler and causes the flashing light to cease flashing. When conditions return to normal, the alarm light goes out, the normal light goes on, and the system is ready for the next cycle of operation.

This acknowledgement switch also serves as a test switch and permits testing of all circuits and control equipment.

The system is primarily designed to indicate departure from a predetermined normal condition of temperature, pressure, levels, etc. The units are available for panelboard or surface mounting, with cast explosion-proof enclosures for Class 1, groups C and D hazardous location, cast vapor-tight enclosures for moist locations, and sheet steel enclosures for general purpose application.

•

Insulating Oils Reclaimed By Triple Filtration

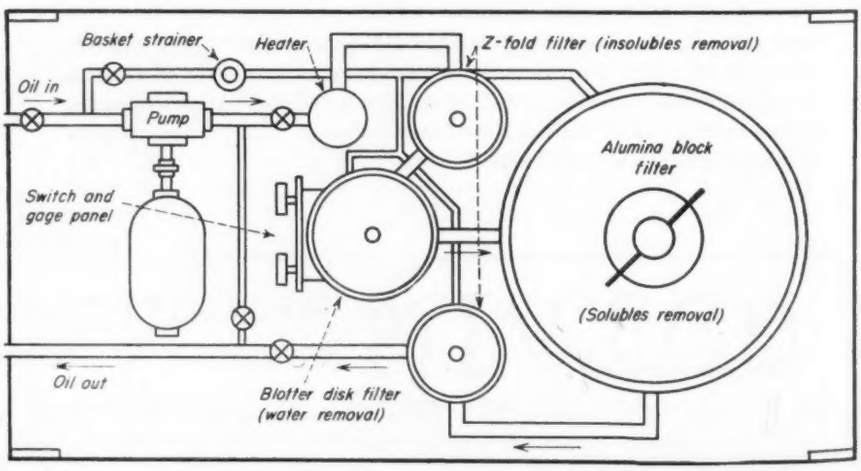
RECLAIMING and continuous maintenance of insulating oils by passing them through cellulose material, alumina blocks and blotters is reported attained by equipment now being announced by Briggs Filtration Co., Bethesda 14, Md. Among the test data reported on one installation are, when maintenance started, neutralization No. 275, dielectric 30 kv., and no sludge visible. Oil was reported as clear and highly polished. This oil had previously been reclaimed from neutralization No. 85 before installation of the equipment.

After 12 months operation with temperature of 70 deg. C. the oil was found to have a neutralization No. 175, dielectric 29.5 kv., and no sludge visible, the report states. It also states that no change in color was apparent on the breather unit indicator, no moisture nor rust on the inside transformer cover, and that the oil color was improved.

The unit, called the Briggs Insulating Oil Reclaimer, works on a recirculating principle and allows the operator to control the degree of treatment given the oil. It pumps the oil from the transformer, switch or breaker through three steps of filtration before returning it to the tank. In the first step solids are removed by the Z-Fold refill. This is made up of pleated and Z-folded layers of ribbed cellulose attached to a permanent center tube.

Water is next removed in a disc-type refill which contains layers of blotters. In the final step, the oil passes through the absorbent refill block where acids are eliminated.

The unit can be used either as a stationary or portable piece of apparatus. It can be operated by one man without removing a transformer from service. All refills are reported as restorable to original effectiveness by the use of steam and heat.



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New Floodlight Developed For Yankee Stadium

ANNOUNCEMENT of a new sports floodlight designed especially for the Yankee Stadium has been made by General Electric's Lighting Division, Schenectady 5, N. Y. Designated as the Type L-69, the new floodlight is adaptable for all sports field and recreation areas that require lamps of 750- to 1,500-watt sizes.

The front-door glass, instead of being a separate part mounted on the reflector by a hinge and secured by a latch, is an integral part of the reflector. This is accomplished by having the forward edge of the aluminum reflector spun over the rim of the glass, making a dirt-, weather-, and insect-proof seal. The $\frac{1}{4}$-inch Tufflex tempered plate glass is heat and impact resistant.

Access to the interior of the reflector and to the lamp is gained by unfastening two toggle latches and lifting the aluminium socket housing from the reflector. The hous-

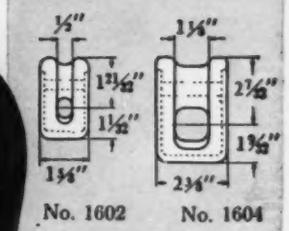
30 years of Proof!

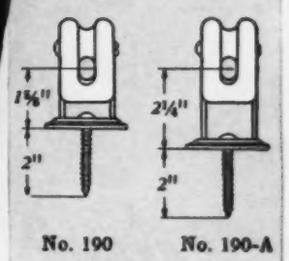
HUBBARD No. 190 WIREHOLDER

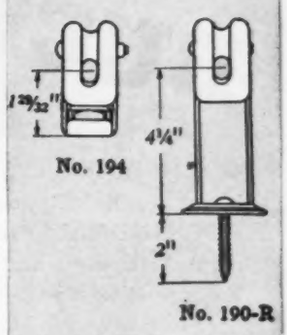
For more than 100 years, Hubbard and Company has enjoyed the privilege of serving industry with its greatly diversified products of the durable goods class.

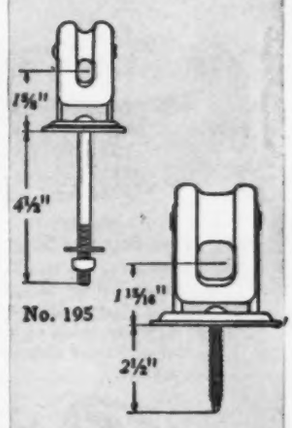
During the latter half of this century of service, the most notable group of materials has been a complete line of Pole Line Hardware, and for more than thirty years, Hubbard No. 190 Wireholders have been produced in quantities reaching well into the millions.

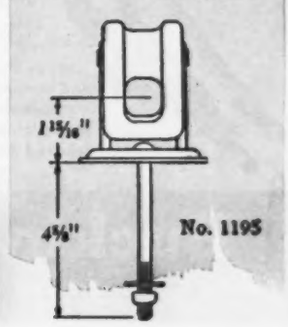
This old, reliable design with its variations shown here, is the favorite of many engineers and linemen from coast to coast. They know, that in thirty years of service, the Hubbard No. 190 has encountered every hazard to which a wireholder may be exposed. They know it has a slender pointed, full threaded screw for easy starting and maximum holding power in sheeting or solid wood. They know that its strength is much greater than that of the average service wire. They have discovered that this strength is due to the fact that the porcelain insulator is in compression with metal supports, not in tension, which is the weakest state of porcelain. They have thirty years proof that the Hubbard No. 190 has what they want in a wireholder.





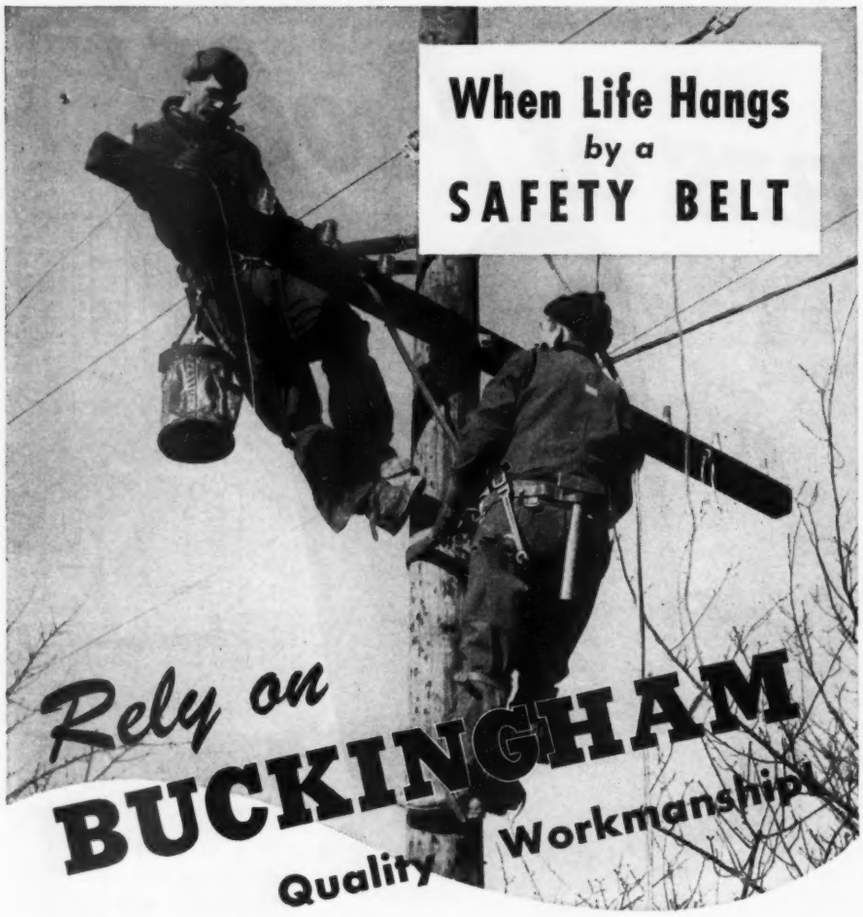






Stock No.	DIMENSIONS—INCHES				Approximate Shipping Wt. Lbs., 100 Pcs.
	Insulator	Size of Screw, Bolt or Tap	Extension Base to Ctr. of Wire Hole	Size of Wire Hole	
190	1602	No. 22 x 2 Wood Screw	1-5/8	9/16 x 3/4	105
190-A	1602	No. 22 x 2 Wood Screw	2-1/4	9/16 x 3/4	115
190-R	1602	No. 22 x 2 Wood Screw	4-1/4	9/16 x 3/4	150
194	1602	5/8 Tap	1-29/32	9/16 x 3/4	95
195	1602	3/8 x 4-1/2 Carriage Bolt	1-5/8	9/16 x 3/4	140
1190	1604	No. 24 x 2-1/2 Wood Screw	1-15/16	1-1/8 x 1-1/8	228
1195	1604	3/8 x 4-5/8 Carriage Bolt	1-15/16	1-1/8 x 1-1/8	240

HUBBARD and COMPANY
PITTSBURGH • CHICAGO • OAKLAND, CALIFORNIA



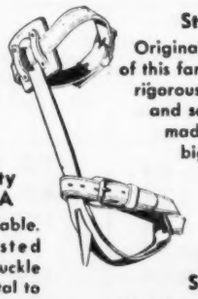
● High in the air . . . haunted by the hazards of carelessness, hot wires, or equipment failures . . . that's when the security of BUCKINGHAM safety equipment eases the physical and mental tension, and enables linesman to do their best work. Fatigue is lessened. Discomfort held at a minimum. And behind it all is a 45-year reputation for quality, workmanship and advanced design that has made Buckingham equipment a favorite all over the United States.

Write for Catalogue 24 showing the complete Buckingham line.

Buckingham distributors in many principal cities

Buckingham Easy Belt No. 58

Floating Feature insures full tool loops under all conditions. No rivet heads or metal contact the body. Made of tan harness leather and lined with soft chrome lace leather.



Stephens Climbers

Originator and sole manufacturer of this famous climber, Buckingham rigorously maintains the quality and safety standards that have made them a favorite with big users for 45 years.

Buckingham Standard Safety Strap No. 42A

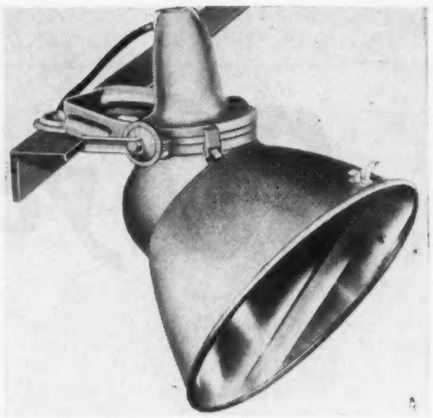
Safe and dependable. Drop-forged, tested snaps and buckles. Buckle end reinforced with metal to increase strength and wear. Made from backs of best selected harness leather.

Buckingham Spur Protectors

Keep your spurs sharp and give your climber longer life.

Buckingham MANUFACTURING CO., INC.

Walter E. Craw, President — 5-7 Travis Street, Binghamton, N. Y.



ing can be removed without disturbing the position of the reflector, and the latches are positioned so that the socket housing cannot be improperly remounted. A clip is mounted on the socket housing so that the removed assembly can be clipped to the trunnion bracket in a convenient position.

To facilitate aiming the center of the beam when adjusting the floodlight for coverage of the area, a blade sight is located on the reflector and a notch sight on the socket housing. A pointer and degree scale are provided on one trunnion for setting of the floodlight in the daytime. Set against the pointer is a repositioning stop that is locked in place after the final adjustment has been completed. Thus, the return of the reflector to its original position is assured if it ever becomes necessary to invert for servicing. Normal servicing requires no movement of the unit.

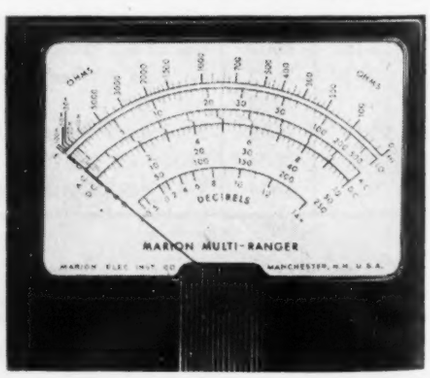
A steel trunnion bracket supports the reflector, and is in turn riveted to a malleable-iron mounting plate that includes a degree scale. Total movement, both in elevation and azimuth, is 180 degrees. Located on the same trunnion as the elevation scale is a built-in clamping-bolt wrench that is used for adjusting and locking the reflector. All materials and finishes are corrosion-proof.

•

Voltage, Current, Resistance From Single Meter

A NEW foundation instrument, the Marion Multi-Ranger, designed to permit the user to assemble an instrument for use as a voltmeter, milliammeter, high and low resistance ohmmeter, a.c. voltmeter and decibel meter, has been announced by the Marion Electrical Instrument Co., Manchester, N. H.

Multi-Rangers are available in $3\frac{1}{2}$-, $4\frac{1}{2}$- and



CENLACO (HOT DIPPED)
CENTRAL BLACK
UNDERWRITERS' LABORATORIES, INC. INSPECTED RIGID STEEL CONDUIT
CENTRAL
RIGID STEEL
CONDUIT
has pleased a lot of people
in over 30 years
"There's Tested Strength in Every Length"
SPANG-CHALFANT
Division of The National Supply Company
General Sales Office: Grant Bldg., Pittsburgh 30, Pa.
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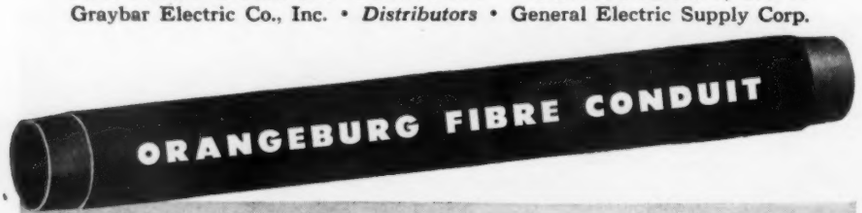
It *will* if the conduit is ORANGEBURG! ORANGEBURG'S exceptionally smooth bore is protection against scoring or abrasion of the sheath as the cable is pulled into the duct . . . This also means less pulling tension and less cable strain—and makes longer pulls possible. Smooth bore and less friction also reduce wear with cable movement under load. Moreover, ground water infiltration is prevented by ORANGEBURG'S impermeable walls and tight taper sleeve joints. Consequently, the possibilities of corrosion are minimized. Write *today* for the ORANGEBURG Catalog.

THE FIBRE CONDUIT COMPANY • ORANGEBURG, N. Y.
Graybar Electric Co., Inc. • *Distributors* • General Electric Supply Corp.



THE FIBRE CONDUIT CO. ORANGEBURG REG. U.S. PAT. OFF. ORANGEBURG, N.Y.

ORANGEBURG

WITH 50 YEARS EXPERIENCE IN THE MANUFACTURE OF NON-METALLIC CONDUIT AND PIPE, SERVES THE POWER AND LIGHT, TELEPHONE, GENERAL CONSTRUCTION, CHEMICAL, PETROLEUM, PLUMBING AND BUILDING SUPPLY FIELDS WITH ELECTRICAL FIBRE CONDUIT . . . ELECTRICAL UNDERFLOOR DUCT SYSTEMS . . . AND FIBRE PIPE FOR NON-PRESSURE USES.

8½-in. sizes and each size is interchangeable electrically. The basic sensitivity of the instrument is 400 microamperes and the internal resistance is 500 ohms, plus or minus 1 percent. The scales are printed in three colors for quick identification and cover a full 100 deg.

The instrument is reported as usable as a 2,500 ohm-per-volt or as a 1,000 ohm-per-volt meter, as a milliammeter, low and high range ohmmeter and as a 1,000 ohm-per-volt a.c. voltmeter. With proper switching arrangements, these features can be incorporated in one piece of equipment.

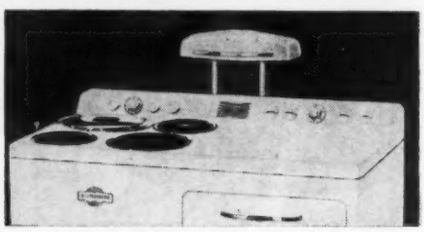
The scale ranges, as normally supplied, include: 0-10-50-250 d.c. volts, 0-10-50-250 a.c. volts, 0-500 ohms and —10 megohms, —10 to +14 db. By use of the proper multiplier the 0-10 voltmeter scale can also be used as 0-1,000 volts. The scales are printed in red, black and green.

Circuits supplied with each instrument provide clear instructions for the construction of single or multi-range equipment; all component values are shown on the circuits.

•

Designed Lighting Added To Range Features

A STREAMLINED, modernistically designed, all metal lamp so designed and positioned as to provide shadowless lighting over the entire cooking and table surface of the range



has been added to the Banquet Model, reports Electromaster, Inc., 1803 East Atwater St., Detroit 31, Mich., manufacturers of the product. At the same time a Minute-Master was also incorporated in the back panel and it was positioned to balance the oven thermostat control.

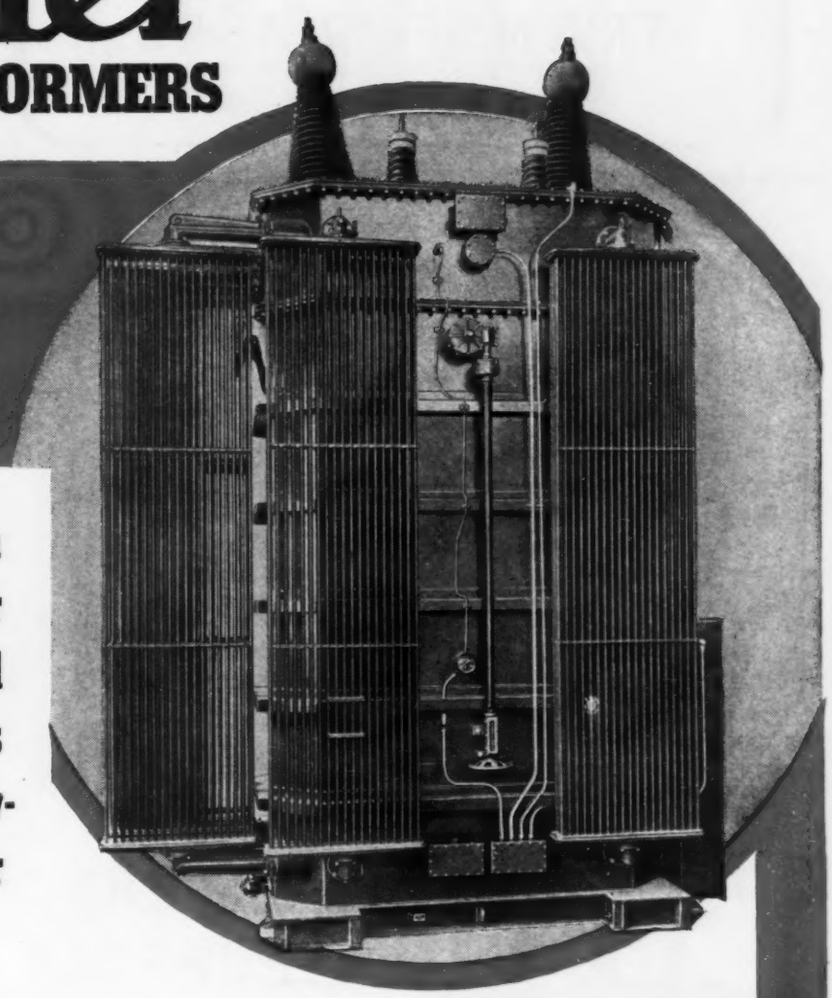
•

Transmitter Eliminates Critically Tuned Elements

FOR broadcast dependability and fidelity combined with simplicity and easy access, a new 1- and 3-kw. FM transmitter which maintains close frequency control without the use of critically tuned elements or moving parts is announced by the Westinghouse Electric Corp., Pittsburgh 30, Pa.

The new transmitter is placed in operation by connecting the audio input, the r-f transmission line and the input power supply. Higher powers may be obtained by adding amplifiers to the basic unit. Single tuning control adjusts M.O. center frequency. Frequency modulation is obtained in a simple circuit using capacitors, resistors and non-microphonic diode tubes. R-f carrier is generated, multiplied and amplified in five steps. Standard commercial type tubes, operated

Wagner
POWER TRANSFORMERS



The unit here illustrated is a 15,000-kva, 110,000- to 13,200-volt, single-phase, 60-cycle Wagner Power Transformer built for a large southern utility.

Built to Maintain a Reputation for Quality Established through 50 years of Dependable Service to the Power Industry

Wagner power transformers of today embody the latest improvements in transformer design and construction executed with the same painstaking care that has made the name Wagner synonomous with quality for over half a century.

Every power transformer purchaser, of course, has specific needs which must be met. Therefore, each Wagner power transformer is built to meet these necessary predetermined considerations. Various parts and the methods of fabricating them are standardized, but their final assemblies vary as each individual customer's requirements dictate. T46-14

Wagner builds a complete line of distribution and power transformers, completely described in Bulletins TU-180 (Distribution) and TU-181 (Power). Wagner Electric Corporation, 6456 Plymouth Avenue, St. Louis 14, Mo.

Other WAGNER Products for Industry:

Air Brakes
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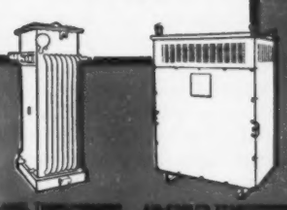
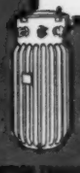
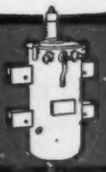


Wagner WE

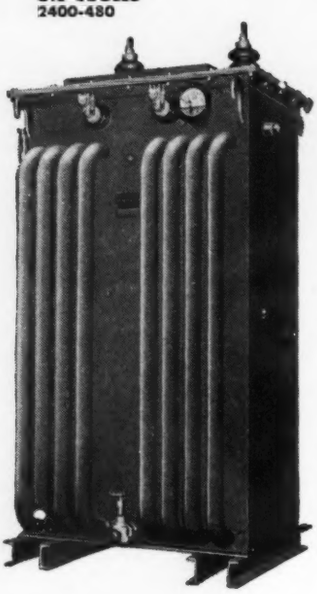




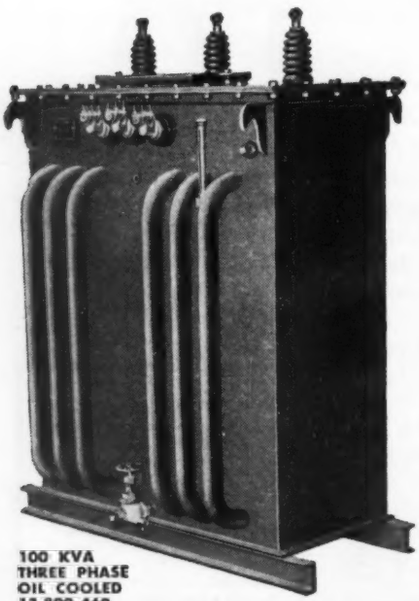
DAVIS TRANSFORMERS

250 KVA
SINGLE PHASE
OIL COOLED
2400-480

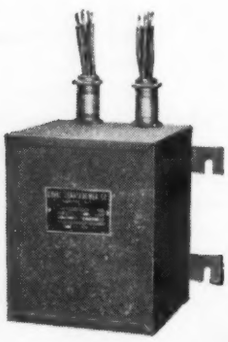
DRY-TYPE DISTRIBUTION
From 15 KVA through 100 KVA, Equipped for Floor or Wall Mounting.



QUALITY TRANSFORMERS *for* EVERY PURPOSE



100 KVA
THREE PHASE
OIL COOLED
13,800-460



DRY-TYPE
For POWER and LIGHTING From 1 KVA Through 15 KVA 230/460-115/230 Equipped for Wall, Post or Floor Mounting.

DAVIS TRANSFORMER COMPANY

DAVIS TRANSFORMER CO.
Phone 177 CONCORD, N. H.

NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION * MEMBER * NEMA

Manufacturers of Oil Cooled, Dry Type, Power and Distribution Transformers
Also All Types of Specialty Transformers Regardless of Size

below rated plate voltage for reliability and economy, are used throughout.

From top to bottom on the front panel of the new 66-in. by 74-in. self-contained unit are: 1) a hinged window that locks in open position allowing easy access to the low voltage regulator, driver and power amplifier tubes; 2) access to the control panel by means of a door which folds up out of the way and 3) two lower doors which give access to the removable oscillator-driver-audio unit and frequency control unit, power switches and relays. A glass panel allows visual inspection of the high voltage rectifier tubes.

•

New Diffusing Glass Developed for Fixtures

ALBA-LITE is a new form of diffusing sheet glass developed for commercial and residential fluorescent lighting fixtures and was shown for the first time at the Chicago Lighting Exposition by the Corning Glass Works, Corning, N. Y. It is reported as a homogeneous glass with high light transmission and low light absorption characteristics. It is regularly supplied as annealed but may be tempered for added mechanical strength and safety.

It is available in flat sheets or bent to fixture manufacturer's specifications and with or without flanges. It is made in 1/8- and 7/32-in. nominal thicknesses. The new glass is stated to be light in weight and easily kept clean.

•

Lucite Becomes Aid To Lighting Engineer

NEW FORMS of "Lucite" acrylic resin containing luminescent pigments—a fluorescent type which glows when exposed to ultraviolet, or "black" light, and a phosphorescent type, which glows in the dark after exposure to ordinary light—were announced recently by the plastics division of E. I. du Pont de Nemours & Co., Inc., Arlington, N. J.

Sheeting of both types is expected to find uses in advertising signs, instrument and light panels, and decorative interior "lighting." The sheets are expected to be made in a wide range of colors and thicknesses and in the standard sizes of regular "Lucite."

•

3-Position Tumbler Switch Developed for Appliances

THE 3-position tumbler switch is a single pole — double throw switch with intermediate OFF position for the control of two separate circuits and is a development of the Ark-Les Switch Corp., 51 Water St., Watertown 72, Mass. It consists of a molded Bakelite body and square operating lever with threaded face bushing of metal, with key slot for locating and knurled face nut, and has a capacity of 15 amp. at 125 volts a.c.

The exposed metal portion of the switch can be furnished in a variety of finishes.

TOUGH?

ALZAK* ALUMINUM is literally "First Cousin" to a grinding wheel!

*Registered Trademark

HIGH EFFICIENCY IN "REVERE" AIRPORT FLOODS!

Revere Electric Manufacturing Company makes wide use of Alcoa Aluminum in their 7100 Series Enclosed Type Floodlights. Alzak Aluminum specular reflectors are used for narrow beams, diffuse for wide beam types. Shell is spun aluminum, with cast aluminum neck and socket mounting.

Aluminum oxide is a tough material as abrasives go—it's used in many a grinding wheel. As reflector surfaces go, it's *exceptionally* tough—scratch-resistant, heat-resistant, an ideal protective coating for the reflective surface beneath.

The Alzak process produces this tough protective coating on the surface of Alzak Aluminum Reflectors. That, plus the characteristics of Alcoa Aluminum itself, makes possible the high efficiency of this Alcoa product for incandescent, fluorescent, or radiant applications.

And the easy formability of Alcoa Aluminum makes it easy to carry out design ideas with a minimum of production complications and a maximum of sales appeal and all-around usefulness. ALUMINUM COMPANY OF AMERICA, 1978 Gulf Building, Pittsburgh 19, Pennsylvania.

ALCOA FIRST IN **ALUMINUM**

ALCOA ALUMINUM

Crapo
STEEL CONDUCTORS

Because of its high tensile strength, its ruggedness and its conductivity, *Crapo* HTC-130 Steel Conductor is both practical and economical as an overhead ground wire. Its superior strength makes possible long spans with flat sags and greater clearances. Its rugged physical characteristics give it a high fatigue endurance limit, enable it to withstand severe shock and deformation.

The all-'round dependability and economy of *Crapo* HTC-130 Steel Conductor as an overhead ground wire have been established by its performance under actual operating conditions. Leading utilities have adopted it on the basis of their own experience.

• • •

Crapo Steel Conductors are distributed by Graybar Electric Company, Inc. Ask the Graybar representative or write for your copy of the *Crapo* Steel Conductor Manual!

Crapo HTC-130 Steel Conductors for overhead ground wires are available in Standard (3-wire) and Solid types. Physical properties for sizes No. 4 and No. 6 (B.W.G.), in both types, are shown below:

Conductor Size B. W. G.	Type of Construction	Diameter of Conductor (inches)	Minimum Breaking Strength (lb.)
4	3-wire	0.297	5610
6	3-wire	0.252	4295
4	Solid	0.238	5784
6	Solid	0.203	4208

INDIANA STEEL & WIRE COMPANY
MUNCIE, INDIANA

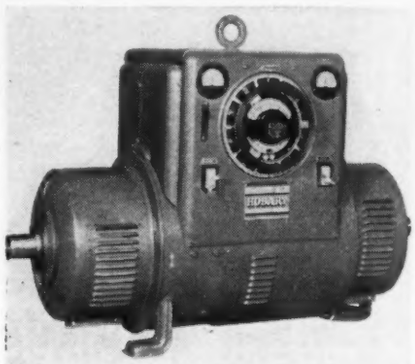
The switch can be supplied with tin solder lugs or binding screw terminals. It is reported as applicable to electrical appliances as a control for reversing small motors or the control of separate loads from one source of supply.

The switch is stated to be easily mounted in sheet steel panels requiring 0.625- to 0.628-in. diameter hole with 0.085- to 0.038-in. keyway. It is $\frac{3}{4}$ in. in diameter. Overall height from end of molded Bakelite Tumbler to solder lug $1\frac{1}{4}$ in.

•

Synchronous Motor Welder Helps Line Power Factor

UTILIZING an inbuilt separate exciter, The Hobart Brothers Co., Troy, Ohio, are announcing a new Synchronous Motor Welder



which is reported so proportioned that it can be started across the line and automatically synchronizes itself by the build up of the separate exciter. The starting current on this unit is stated to be approximately the same as a conventional induction motor of the same horsepower capacity.

It is recommended that this unit be operated to draw leading current at no load so as to compensate for other low power factor loads and thereby make it a power saving load, both from the standpoint of the public utility and customer.

The motor of this welder is a Hobart revolving field synchronous type. It is furnished with heavy squirrel cage winding to make easy starting as a conventional induction motor. Once up to speed the exciter builds up and automatically applies correct excitation to motor fields. This machine can also be used as an a.c. generator for the operation of small tools, lathes, grinders, etc. This is done by coupling the shaft to a gasoline or electric motor and the synchronous motor then becomes an a.c. generator.

•

Wave Guides Designed For Electrical Equipment

RECENTLY released for civilian use are various types of flexible wave-guides made by the metal hose branch of the American Brass Co., Waterbury 88, Conn. These guides were produced in quantity during the war for use in radar and other microwave equipments. They are made for operation at wavelengths from 20 to less than 3 cm.

Illustrated are two assemblies of the so-

These Distributors can Make Fast Deliveries of Fiberglas Electrical Insulation Materials NOW!

ATLANTA, GEORGIA
Insulation & Wires Inc.

BLUEFIELD, WEST VIRGINIA
National Electric Coil Co.

BOSTON, MASSACHUSETTS
Insulation & Wires Inc.
Mica Insulator Co

CHICAGO, ILLINOIS
Insulation Mfrs. Corp.
Mica Insulator Co.
Prehler Electrical Insulation Co.

CLEVELAND, OHIO
Insulation Mfrs. Corp.
Mica Insulator Co.
Prehler Electrical Insulation Co.

COLUMBUS, OHIO
National Electric Coil Co.

DALLAS, TEXAS
Summers Electric Company

DETROIT, MICHIGAN
Insulation & Wires Inc.

HOUSTON, TEXAS
Insulation & Wires Inc

LOS ANGELES, CALIFORNIA
Electrical Specialty Co.
Triangle Pacific Company
Tri-State Supply Corp

MINNEAPOLIS, MINNESOTA
Insulation Mfrs. Corp

NEW YORK, NEW YORK
Mica Insulator Co.
Mitchell Rand Insulation Co., Inc.

PHILADELPHIA, PENNSYLVANIA
National Electric Coil Co.

PITTSBURGH, PENNSYLVANIA
Earl B. Beach Co

PORTLAND, OREGON
Electrical Specialty Co.,

SAN FRANCISCO, CALIFORNIA
Electrical Specialty Co
Triangle Pacific Company
Tri-State Supply Corp

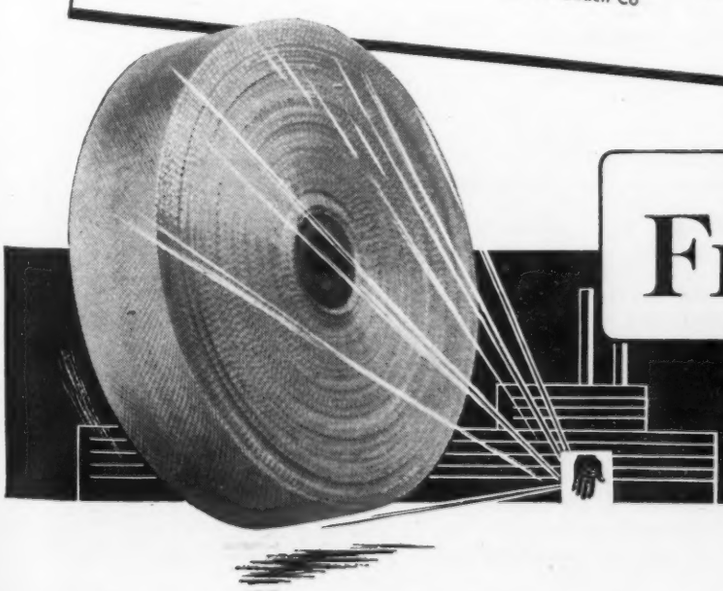
SEATTLE, WASHINGTON
Electrical Specialty Co
Tri-State Supply Corp

ST. LOUIS, MISSOURI
Insulation & Wires Inc.
White Supply Co.

TRAFFORD, PENNSYLVANIA
Westinghouse Electric Corp.

WILLIAMSPORT, PENNSYLVANIA
Lowry Electric Co., Inc.

WESTINGHOUSE ELECTRIC CORP
Branches in Principal Cities



OWENS-CORNING
FIBERGLAS
TM REG US PAT OFF

YARNS—TAPES—CORDS—SLEEVINGS

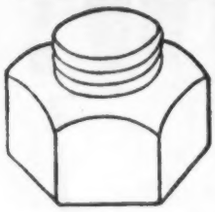
Cloth and other forms: Magnet wire, Lead wire, Special wires, Varnished cloth and tape, Mica combinations, Laminates, Saturated sleevings, Varnished tubings, Pressure-sensitive tapes, Special products.

Wherever Bolted Assemblies Must Stay Tight

Rely on Double Locking

PALNUT LOCKNUTS

—and save cost, too!



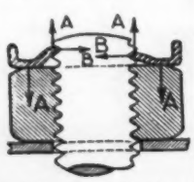
THIS ORDINARY ASSEMBLY, consisting of bolt and regular nut, can be kept absolutely tight in service

. . WITH THE ADDITION OF A PALNUT, which spins on easily on top of regular nut and

. . BECOMES A VIBRATION-PROOF ASSEMBLY when the Palnut is tightened with 1/3 turn of a wrench. Double-locking action* keeps bolt and nut secure.

*** Double-locking action**

Arched, slotted jaws grip the bolt like a chuck (B-B), while spring tension is exerted upward on the bolt threads and downward on the regular nut (A-A), securely locking both.



● Palnuts are available in full range of sizes, in plain, parkerized, cadmium and hot dip galvanized finishes. Send for samples and literature.

The PALNUT Co.

51 CORDIER ST., IRVINGTON 11, N. J.

called "interlocked" type of flexible waveguide; the completed assembly with a molded synthetic rubber jacket is known by the trade name of MOLDLOCK. This type is made by spirally winding a formed metallic strip around an arbor, interlocking the edges to produce a rectangular flexible tube. It is available in standard lengths mating with the common sizes of rigid guide. It can be bent in either of two planes and will withstand appreciable twist. Molded assemblies are pressure tight and quite rugged.

Also available is a vertebra-type, flexible waveguide assembly. This is made up of a series of metallic choke-plate wafers which are inserted in a synthetic rubber jacket and this is ribbed to provide proper spacing and alignment. This type of guide is reported to flex easily and to withstand repeated deformations. It will bend, shear, twist, stretch and compress. For use in pressurized systems the jacket is reinforced with a casing of flexible metal hose.

The third type is a seamless flexible waveguide assembly made by corrugating a seamless thin-wall rectangular metallic tube. It can be bent to small radii in either or both of two planes and extends and compresses accordion-fashion. It will withstand a large number of flexures of moderate amplitude. Although seamless assemblies are pressure tight, a synthetic covering is sometimes applied for additional protection.

Flexible waveguides are expected to find many applications in electrical and radar equipment where relative motion is involved such as with shock-mounted or vibrating units, also to provide for misalignment between units, for fabrication of complicated twists and bends and as flexible couplings to fragile components.

Dielectric Loss Reported Low up to 3,000 Megacycles

A NEW plastic material, tetrafluoroethylene resin—to be given the trade name "Teflon"—which is reported to withstand acids which dissolve gold and platinum and which is stated to retain its strength and form at higher temperatures than any known organic material, was disclosed recently by E. I. du Pont de Nemours Co., Inc., Wilmington 98, Del. It is reported as useful in high frequency equipment (up to 3,000 megacycles) because of its reported low dielectric loss factor.

Other properties reported are "zero" water absorption rate, high impact strength and toughness. The report states that it has been successfully used as an electrical insulator at high temperatures. Other uses reported are conduits subjected to attack by corrosive materials and as spacers for coaxial cable.

It was subjected to a temperature of 572 deg. F. continuously for a period of three months with virtually no degration, the company reports. Limited amounts in the form of sheets, tubes, rods, coated wire, tape and fabricated sections are now available for experimental purposes.

●

Fluorescent Incorporated In Magnifying Device

MAGNALITE is a new visual aid that combines magnification with illumination and is being announced by the Haas Corp., Mendon, Mich. Magnification is provided by a 5-in. optically ground magnifier; illumination is provided by two 4-watt fluorescent tubes.

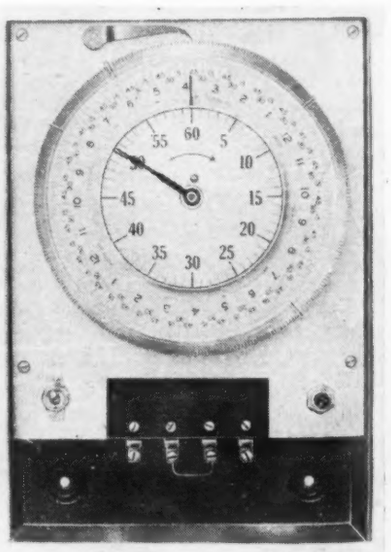
The unit was designed primarily for close inspection and is recommended for first-aid rooms and dentist's and doctor's offices. It is made in both pedestal and table models and has a floating arm which supports the fluorescent tubes and the magnifying lens.

● ● ●

Electric Time Switch Simplifies Programming

NEW simplified automatic control of radio and recorded programs has been perfected by Zenith Electric Co., 152 West Walton St., Chicago 10, Ill. This control is embodied in a company's program time switch Type PR-24, which operates automatically to periods as close as five minutes throughout the 24 hours, or any part thereof. It repeats daily, requiring no further attention than the setting. Changes in the setting are easily and quickly made without tools.

The unit is reported as a time-saver for schools, factories, and institutions wherever radio or recorded programs are a daily feature. It can be used to cover any radio or recorded program, or range of programs. The control turns on and off the stations of records exactly as predetermined. It is compactly enclosed in a steel case only 8 in. wide, 12 in. high and 4 in. deep.



NEWS ABOUT PEOPLE

Wisconsin Utility Makes New Sales Assignments

L. W. Byron and M. R. Norton, veteran district sales supervisors of the Wisconsin Power & Light Co.'s Beloit and Fond du Lac districts, have joined the general sales department at Madison.

L. W. Byron

Mr. Byron will serve as merchandising supervisor in charge of the merchandising program for the company's entire service area. He will supervise stock control, coordinate window and floor displays with the general sales program and conduct a continuous training program for district salesmen.

M. R. Norton

Mr. Norton, who is to be dealer cooperation manager, will supervise a program of assistance to appliance dealers, electrical contractors and plumbers and will assist in coordinating the company activities with those of dealers, manufacturers and wholesalers.

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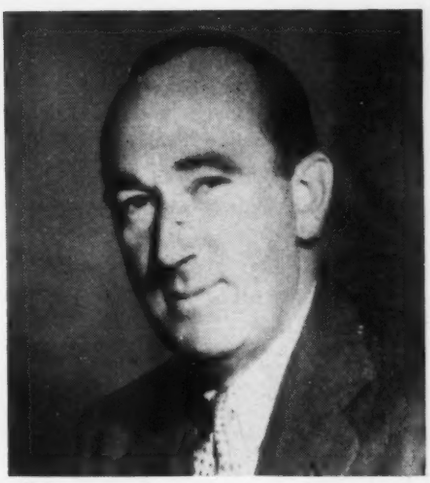
Cranston Made President of Thermador Electrical

Announcement of the appointment of William E. Cranston as president of the Thermador Electrical Manufacturing Co., Los Angeles, has been announced. Formerly vice-president and general manager, Mr. Cranston succeeds Harrison H. Fogwell, who has become chairman of the board.

Clyde I. Harding has been made vice-president in charge of production; F. M. Pence, vice-president in charge of engineering, and Frank A. Ballman, vice-president in charge of sales.



W. E. Cranston

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► Charles Johns, who organized and directed plant protection for the Pennsylvania Electric Co., Johnstown, Pa., during the war, has been transferred to the commercial engineering department. In his new assignment, he will direct his efforts to increasing the use of commercial electric cooking throughout the company's territory.

► Richard L. Rosenthal has been elected president of the Citizens Utilities Co., Minneapolis, Minn., succeeding Joseph Chapman. H. B. Atkin was named vice-president; Lawrence Lachman, treasurer, and C. E. Steele, secretary.

Engineering Vice-President Elected by Roebling's

Announcement has been made by John A. Roebling's Sons Co., Trenton, N. J., that Ferdinand W. Roebling, III, has been appointed vice-president in charge of engineering. He succeeds Charles M. Jones who has become vice-president in charge of public and industrial relations. Both men are on the company's board of directors.

F. W. Roebling, III

Upon his graduation from Princeton University in 1933, Mr. Roebling became a member of the engineering staff at Roebling and continued in that capacity until called to active military service in 1940. He recently returned to the company after serving with the U. S. Army Engineers for five years.

Mr. Jones joined the Roebling staff in 1926, and has held many positions of responsibility within the company. He is widely known in engineering circles, as well as in the field of public and industrial relations.

Appointment of Fred J. Maple as manager of exhibits has also been announced. Mr. Maple, who was formerly manager of advertising, has long been active in this field. Albert Neroni has been appointed to succeed Mr. Maple as manager of advertising. He was formerly assistant manager of advertising for Anaconda Wire & Cable Co., Inc.

•

► Marion Grady, a meterman with the Indianapolis Power & Light Co. for 36 years and for many of these years active

in a supervisory capacity in the meter department, has recently been made meter and relay superintendent.

•

Wheeler Insulated Wire Co. Names Park Sales Manager

E. L. Park has been appointed national sales manager for Wheeler Insulated Wire Co., Bridgeport, Conn. The company recently became a division of The Sperry Co.

Mr. Park began his career in the electrical industry with the Lindley Electric Co., Philadelphia, where in 1936 he introduced the indicator fuse. A few years later he became interested in

E. L. PARK

fluorescent lighting and, leaving the Lindley Co., he joined the organization of Frank Kelley, Inc., Elkins Park, Pa., where he marketed one of the earliest lines of industrial fluorescent fixtures.

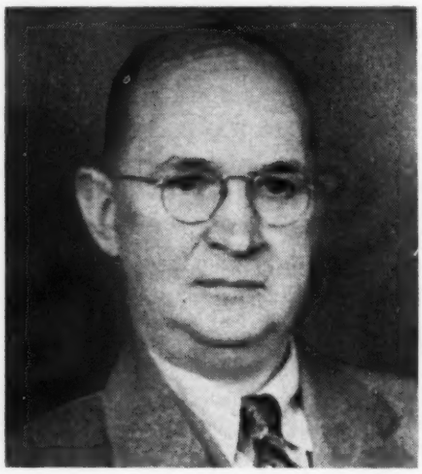
Mr. Park joined the Wheeler organization in 1939.

•

▶ D. W. DELAURIER has been appointed district manager of the Otter Tail Power Co. at Canby, to succeed C. W. REID, resigned. Prior to joining the Otter Tail utility in 1928, Mr. DeLaurier was identified with the Minnesota Power & Light Co. in Little Falls. Mr. Reid has been associated with the electric power industry for 45 years. He obtained his early experience in Wisconsin and Nebraska and after four years in government service he was employed from 1911 to 1921 in construction of electric plants in North Dakota and Montana. He went to Canby in 1923 to work for the Union Public Service Co., was transferred to Elkton, S. D., but returned in 1927 to Canby as superintendent of construction. In 1933 he was made manager. When Union was merged with Otter Tail in 1941, Mr. Reid became Canby district manager.

P. L. Rigby Made President of R. Thomas & Sons Co.

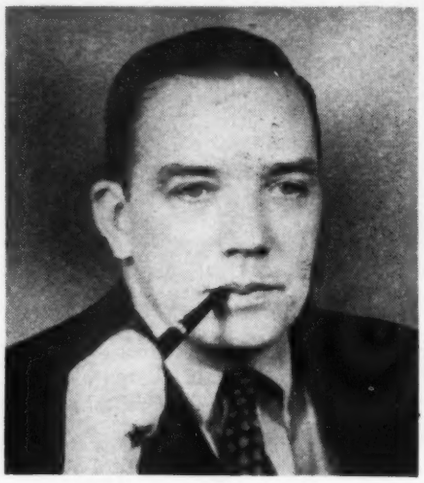
Announcement has been made by the R. Thomas & Sons Co., Lisbon, Ohio, of the election of P. L. Rigby to the



P. L. RIGBY

position of president and treasurer. He succeeds H. T. Williams, who has retired after 20 years of service.

Other officers elected included: E. W. Thomas, first vice-president and general manager; H. R. Holmes, vice-president



E. W. THOMAS

and secretary; Charles R. Thomas, chairman of the executive committee, and R. T. Mason, production manager.

Mr. Rigby has been a member of the company's board of directors for 19 years. He also has been vice-president and secretary since 1942. A graduate of Ohio State University, he was an attorney-at-law at East Liverpool, Ohio, until the time he became a member of the board of R. Thomas & Sons Co.

Mr. Thomas has been a member of the board of directors, vice-president and advertising manager since 1938 and has been with the company since 1928 as assistant sales manager and advertising manager. He is a graduate of the University of Michigan.

•

Electrical Engineers Equip. Promotes J. M. Woodmansee

James M. Woodmansee, who recently rejoined the Electrical Engineers Equipment Co., Melrose Park, Ill., after two years in military service, has been made assistant to the president of the company.

Mr. Woodmansee became identified with Electrical Engineers Equipment Co. in 1934, working at first in manufactur-

J. M. WOODMANSEE

ing departments and later in other departments. He entered the U. S. Navy in 1943 and, upon his return from Japan, he was discharged in December, 1945. Again associating himself with the company he was elected to the board of directors last February.

•

▶ C. R. RIGGLE, supervisor of power sales for the Youngstown division of Ohio Edison Co., Akron, has been named industrial engineer for the Warren, Ohio, division of Ohio Public Service Co., succeeding N. J. Roberts, now chief industrial engineer for the company.

▶ JAMES T. COATSWORTH, commercial director of the Edison Electric Institute, has received the Legion of Merit award for meritorious service during the war in the post of assistant chief, field division, National Headquarters, Selective Service System. The award was made at Washington by Maj. Gen. Lewis B. Hershey, Director of Selective Service, in a special ceremony.

▶ EDWARD F. LAFOND has been appointed supervisor of the lighting division of the Delaware Power & Light Co., Wilming-

HIGH TUBE WALL TEMPERATURE

is one of the variable conditions influencing the choice of the proper Condenser Tube

or Heat Exchanger Tube Alloy. (The first of a series of discussions on tube selection presented by Scovill engineers)

The chemical reactions affecting corrosion of condenser tubes are accelerated by increased temperature. Chemical corrosion, which may have a negligible effect on condenser tube life with the circulating water at 32°F. and clean tubes, assumes major proportions when the circulating water temperature reaches 80°F. and the tube wall temperature is further elevated by the presence of a heavy internal scale which retards heat transfer from the tube wall to the cooling medium.

In actual operating conditions, where the tube wall temperature is only one of the variables, tube life depends on the nature and/or extent of such other factors as:

Velocity and turbulence of coolant . . . Dissolved or entrained air or gases . . . Chemical composition of coolant . . . Chemical or electrochemical actions . . . Marine growths or other deposits . . . Sewage and wastes present . . . Development of protective film . . . Media surrounding tubes.

One of the principal objects of Condenser Tube Technical Research has been the development of alloys designed to give the user longest tube life and most trouble-free service. Depending on other conditions encountered, Phosphorized Admiralty is a satisfactory alloy for temperatures up to about 480°F. and Cupro-Nickel for temperatures up to 570°F.

The conditions surrounding any given condenser tube application are so many and varied, that each installation must be treated as an individual problem.

Scovill has made or is making extensive studies of condenser and heat exchanger tube service conditions for every known application, and offers the facilities of its Technical Service Department to aid in the selection of suitable tube alloys to meet specific service conditions, in an existing or proposed installation.

THREE SCOVILL SERVICES

Scovill's *Service in Men* offers specialized consultation on individual tube application problems and suggestions regarding alloy selection and tube installation practice. *Service in Metals* includes the production of a broad range of tube alloys under laboratory control, which verifies that Scovill alloys conform to specifications. *Service in Manuals* consists of literature providing the latest, most authentic information on condenser and heat exchanger tubes, which has its source in the broad experience of our engineers and the findings of our laboratories. For free copy of the *Condenser Tube Booklet*, write us.

ONE PRODUCT
THREE SERVICES
Service in Manuals
Service in Metals
Service in Men

SCOVILL

Scovill
CONDENSER TUBES

Scovill Manufacturing Company, 24 Mill Street, Waterbury 91, Connecticut. *Export Department:* 405 Lexington Avenue, New York 17, New York

ton, Del. Mr. Lafond was formerly connected with the Philadelphia Electric Co. for a number of years.

•

Dr. O. W. Eshbach Awarded Chanute Medal for 1945

Dr. Ovid W. Eshbach, dean, Northwestern Technological Institute, has been chosen to receive the Octave Chanute Medal for the year of 1945 from the Western Society of Engineers, Dr. Henry T. Heald, president of the Society has announced. Dr. Eshbach's prize winning paper was on post-war engineering education.

Formal presentation of the medal will be made at a later date. The Chanute

O. W. Eshbach

Medal, founded in 1901 by the late Octave Chanute, is awarded each year for best papers on various phases of engineering education.

•

▶ J. J. Nance will become associated with the General Electric Co. on July 1 as a member of the president's staff with duties as assigned. For the past several years, Mr. Nance has been a vice-presi- of Zenith Radio Corp. and was previously associated with the General Motors Corp.

▶ M. H. Wilson, Virginia Electric & Power Co., has been appointed a member of the Richmond Electrical Examining Board by City Utilities Director Brockenbrough. Mr. Wilson succeeds J. L. Speights, also of Virginia Electric & Power, who is retiring both from the board and from the company.

▶ Walter M. Bird, formerly vice-president and general manager of the Savannah Electric & Power Co., has joined the Carolina Coach Co., Raleigh, N. C., as assistant to President R. C. Hoffman, Jr.

M. W. Kellogg Co. Elects New Chairman, President

Announcement has been made by the M. W. Kellogg Co. of Jersey City, N. J., and New York, N. Y., of the election of the following officers: M. W. Kellogg, chairman of the board; H. R. Austin,

H. R. Austin

president; F. E. Johnson, vice-chairman of the board, and L. H. Harvison, executive vice-president.

The creation of the two new executive positions of chairman and vice-chairman

L. H. Harvison

of the board was necessitated by the company's proposed expanded program of industrial engineering, manufacturing, and process development.

•

▶ Dr. J. Albert Wood, formerly assistant director of the Radar School at Massachusetts Institute of Technology, has joined the Thayer School faculty of Dartmouth College as assistant professor of electrical engineering. As part of his new duties at Dartmouth he will supervise the installation at Thayer School of new electrical laboratory equipment and will direct the electronics work in the school's new electrical engineering course.

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Solar Electric Appoints Neuman Sales Manager

Nichlos L. Neuman has been appointed general sales manager of the Solar Electric Corp., Warren, Pa. Mr. Neuman is a well-known lighting and heating engineer with many years of experience in this field. He will be in charge of all sales, sales promotion, publicity and

N. L. Neuman

merchandising activities of the corporation. Sales offices have been established at 110 William St., New York, and all sales and sales promotion activities will be handled from this office.

•

▶ Dr. Lee A. DuBridge has been elected president of the California Institute of Technology, succeeding Dr. Robert A. Millikan, whose retirement last August left the school without a head. Dr. DuBridge was formerly director of the radiation laboratory at the Massachusetts Institute of Technology.

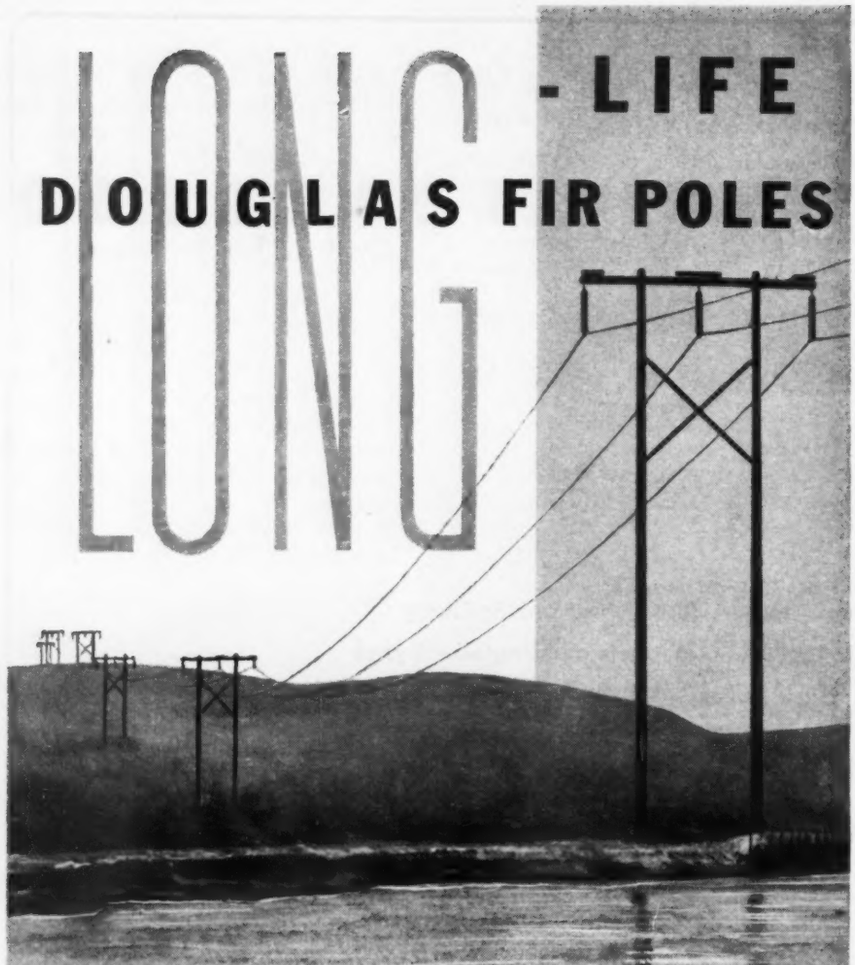
▶ Leo Roy has been appointed assistant superintendent of the electrical distribution division of Quebec Hydro, to succeed the late James Robertson. Mr. Roy joins the Quebec Hydro staff equipped with an extensive knowledge of the electrical field gained through 15 years of practical experience. Joining the operating department of Shawinigan Water & Power Co. at Shawinigan, Mr. Roy became an electrical tester. Transferred to the Montreal office in 1934, he was connected with the power sales division, commercial and distribution department. Three years later he went to Quebec City with the Quebec Power

Gates — Intake, Sluiceway and Spillway
Hydraulic Turbines — Francis and Propeller Types
Rack Rakes • Trash Racks
Valves — Pipe Line and Penstock

★

NEWPORT NEWS SHIPBUILDING AND DRY DOCK COMPANY
NEWPORT NEWS, VIRGINIA

LONG-LIFE
DOUGLAS FIR POLES



Our specialty is long-length Douglas Fir poles, pressure treated for Long-Life service. Prompt shipments of reasonable quantities can now be made in most lengths from 60 foot to 125 foot. Direct rail shipments out of our treating plant stocks can be made to any point in the United States. Write or wire us your inquiries.

Pressure treated Douglas Fir poles have been for years the standard in pole line construction on the West Coast. Our Long-Life Douglas Fir poles meet ASA Specifications and are pressure treated with coal-tar creosote or creosote-pentachlorphenol solution by the empty cell process, 8-lb. retention, in accordance with AWPA Specifications.

Long-Life Douglas Fir poles, pressure treated from high quality Coast-type timber, will cut your maintenance costs and yield longer and more satisfactory service.

Also Produced by J. H. Baxter & Co. of Oregon—*an associated company*
Plant and Yard—Eugene, Oregon

J. H. Baxter & Co.

333 MONTGOMERY STREET · SAN FRANCISCO 4, CALIFORNIA
LOS ANGELES · LONG BEACH · ALAMEDA · CALIFORNIA, U. S. A.

Co. as power sales engineer in charge of electricity and gas sales, power billing, rates and contracts. He became assistant superintendent of the power division in 1941. Secretary of the Quebec section of the Engineering Institute of Canada, Mr. Roy holds membership in the Corporation of Professional Engineers of Quebec, the Canadian Electrical Association and the American Society of Heating and Ventilating Engineers.

•

Mississippi Power Names Agricultural Engineers

Three agricultural engineers, to be located at strategic points throughout the state, have been employed by the Mississippi Power & Light Co. as part of an intensive farm and rural sales program being put on this year by the company.

William Crecink, Neil Craig and Fred Parker, all graduates of the agricultural department of Mississippi State College who have seen service in World War II, are the engineers, who will devote their time to increasing the farm income in their territories and extending electric service to all possible farm customers.

Mr. Crecink will be stationed at Greenville, Mr. Craig at McComb and Mr. Parker at Cleveland, serving the northwestern, southern and northern divisions of the state.

•

► WILLIAM B. CREAGMILE has retired from the James G. Biddle Co., Philadelphia, having completed 27 years of service with that organization. Mr. Creagmile is 70 years of age. He joined the Biddle company in 1919 after serving as professor of electrical engineering at Drexel Institute for about 25 years. During his connection with the Biddle staff, Mr. Creagmile has been technical engineer and engineering advisor to Mr. Biddle, and during later years, to the sales and manufacturing staffs of the company. He has been the author of many James G. Biddle Co. technical publications.

► WILLIAM F. HUELS has retired after 20 years service with the Madison Gas & Electric Co., Madison, Wis., as advertising and welfare director. A graduate of the University of Wisconsin, Mr. Huels served as an engineering instructor there for six years. He also served with the Wisconsin Railroad Commission and the state Industrial Commission.

► T. M. NORTHUM has been made assistant head of the distribution department of the Dallas Power & Light Co. At the time of his promotion he was head of the trouble division. Mr. Northum joined Dallas Power & Light in 1921 and has been with the company continuously since that time, except for a period of about 15

NEW REVERSING CONTACTOR

TYPE 135CXX *Actual Size*

These District Engineering Offices To Serve You

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BUFFALO
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CLEVELAND
DALLAS DENVER
DETROIT HARTFORD
INDIANAPOLIS
LOS ANGELES
MINNEAPOLIS
MONTREAL NEW YORK
PITTSBURGH ST. LOUIS
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SEATTLE SYRACUSE
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Much Smaller—Much Lower in Cost
Fully Dependable for Heavy Duty Service

RATING—1 HP polyphase, ¾ HP single phase, to 600 volts AC.

FEATURES—Small Size—5¾" x 4" x 1⅞".
Mechanically Interlocked.
Solid Frame—no laminations.
Simple Maintenance—all parts removable from front; all fixed contacts alike, all moving contacts alike.
Cost—appreciably lower than conventional units.

APPLICATIONS—Heavy duty reversing and jogging service such as hoists, door operators, and machine tool auxiliaries.

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5,312 RELAY TYPES

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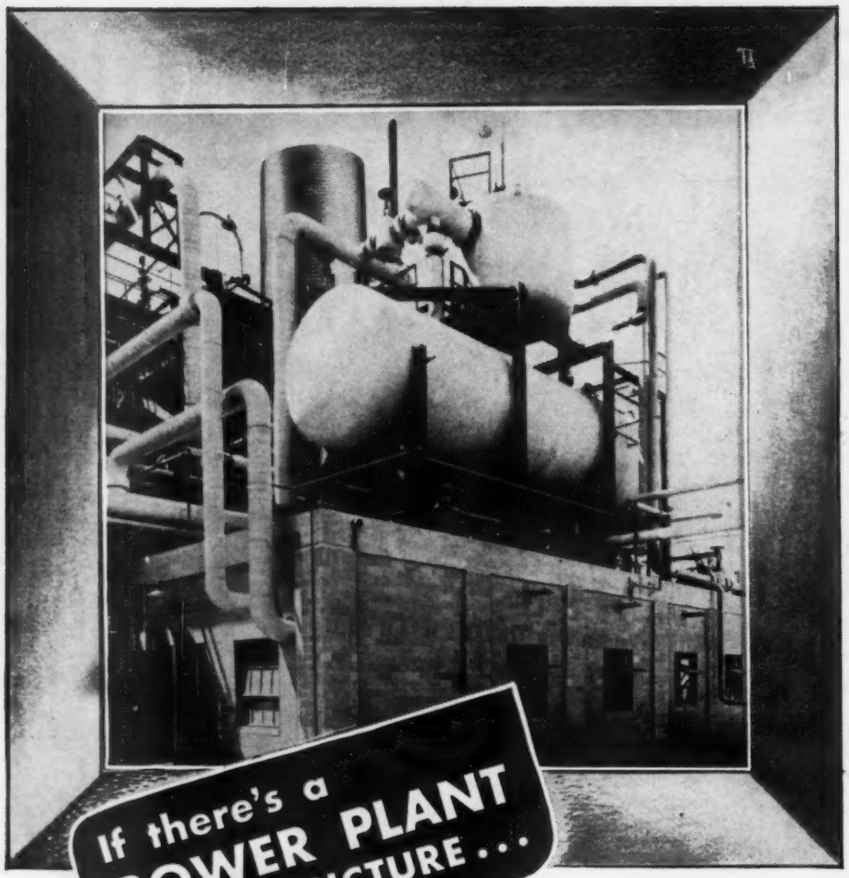

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months in 1924-25. Most of his service has been in the distribution department, but he also spent about eight years in the engineering department. Before being made head of the trouble division about a year ago, Mr. Northum was head of the operating division, distribution department.

•

Electronic Corp. Elects G. Mountjoy President

Directors of Electronic Corp. of America have elected Samuel J. Novick chairman of the board and Garrard Mountjoy president. Earlier this year, Mr. Mountjoy had been made vice-president in charge of engineering. Previously he was in charge of engineering for Lear, Inc. and Sparks, Withington & Co.

Details of Mr. Mountjoy's career were published when he was made engineering vice-president (ELECTRICAL WORLD, March 16, Page 156).

•

▶ FRANK M. SHERRY, formerly assistant to the president of the Virginia Electric & Power Co., has been appointed superintendent of the Petersburg district, succeeding E. M. Hawkins, resigned. A. H. MCDOWELL has been appointed assistant to the president to succeed Mr. Sherry. Mr. Sherry has been a member of the Virginia Electric & Power Staff for 22 years and has served in many of the districts in various capacities. In the course of his connection with the Virginia utility, Mr. McDowell has held various engineering positions and since 1941 has been assistant to the general manager of the electric department.

▶ HARRY C. RANKIN, formerly laboratory engineer of the New England Power Service Co., Providence, R. I., has been transferred to the power sales department of the Narragansett Electric Co., Providence, a leading subsidiary of the New England Power System. He is well known in the Northeast as a specialist in meter engineering.

▶ E. J. MCFADDEN, recently returned after more than three years' service in the U. S. Army, has been appointed sales manager for General Electric water heaters. Mr. McFadden joined General Electric in 1939 to assist in the sale promotion of ranges and water heaters. He later became supervisor of range and water heater sales promotion and just before the war was engaged in advertising of G.E. construction materials.

▶ WILLIAM J. WEAVER, formerly president of the Ansonia Electrical Co., and ALBERT C. MULLER, JR., formerly president of Air Conditioners Sales Corp., both of which companies have been ab-

Silver-Graphite BRUSH HEADQUARTERS

- **LESS RADIO INTERFERENCE**
- **LESS AUDIO AND RADIO FREQUENCY NOISE**
- **LOW CONTACT RESISTANCE**
- **UNIFORM CONTACT RESISTANCE**
- **LONG LIFE**

Twenty years ago, at the suggestion of Westinghouse engineers, Stackpole pioneered silver-graphite contacts. The result was an almost immediate revolution in circuit breaker design. Later, as the advantages of this unique mix were applied to brush engineering, equally important advances were scored, particularly on low-voltage commutator and slip ring motor applications.

Today, the important thing is not so much the fact that Stackpole Silver-Graphite Brushes are supplied in all sizes and shapes. What counts even more is the unsurpassed wealth of engineering experience that permits Stackpole engineers to recommend exactly the correct, "tailor-made" silver-graphite mix for best results on your particular application. Backed with complete details of your equipment, they welcome the opportunity to submit Silver-Graphite Brush (or Contact) samples for test. You be the judge!

STACKPOLE CARBON COMPANY
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BRUSHES AND CONTACTS
(All carbon, graphite, metal, and composition types)
RARE METAL CONTACTS
BEARINGS **WELDING CARBONS**
PACKING, PISTON AND SEAL RINGS
CONTINUOUSLY ADJUSTABLE CARBON RHEOSTATS
CHEMICAL CARBONS
CARBON PIPE POWER TUBE ANODES
MOLDED SPECIALTIES, etc.

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MOLDED METAL POWDER AND CARBON PRODUCTS

Faster than Fire-

RANDOLPH TRIGGER-TOUCH EXTINGUISHERS!

In fighting fires, it's ACTION that counts! With Randolph "4" it's action you get . . . *easy, quick and effective.*

Just one hand snaps this extinguisher from its bracket . . . one trigger-touch sends clouds of penetrating carbon dioxide into the blaze—smothers the fire in *split-seconds!* With no valves or nozzles to adjust, Randolph extinguishers eliminate panic—get the employee to the blaze *before* it spreads!

Randolph "15"

A dry, non-toxic gas, carbon dioxide does not damage equipment or conduct electricity. It leaves no stain or liquid to clean up. And here's a fire-fighting agent that can't freeze or deteriorate . . . ends constant refilling and repairs.

Check up on your flammable liquid and electrical hazards . . . mobilize against fire with Randolph "4", "10", "15" and "25" fast-action extinguishers. To get the complete fire protection facts, simply tear out the coupon below, or write us—today!

Randolph "25"

Randolph Laboratories, *INC.*

10 EAST KINZIE STREET, CHICAGO, ILL.

Please send me your FREE fire protection handbook "How To Fight Fires With Carbon Dioxide" Also rush details on new carbon dioxide fire extinguishers.

NAME _____

COMPANY _____

ADDRESS _____

sorbed into the Noma Electric Corp., have been elected vice-presidents of Noma Electric and will be general managers of the divisions which they have headed in recent years.

▶ GEORGE A. SAWIN, who has been identified with the electrical industry for a number of years, has just retired. Mr. Sawin had been identified with the National Electrical Manufacturers Association since 1939 and before that was connected with the Westinghouse Electric Corp. from 1920 to 1939 at East Pittsburgh. Earlier in his career he was associated with the General Electric Co. at Lynn, Mass., and Public Service Electric & Gas Co., Newark.

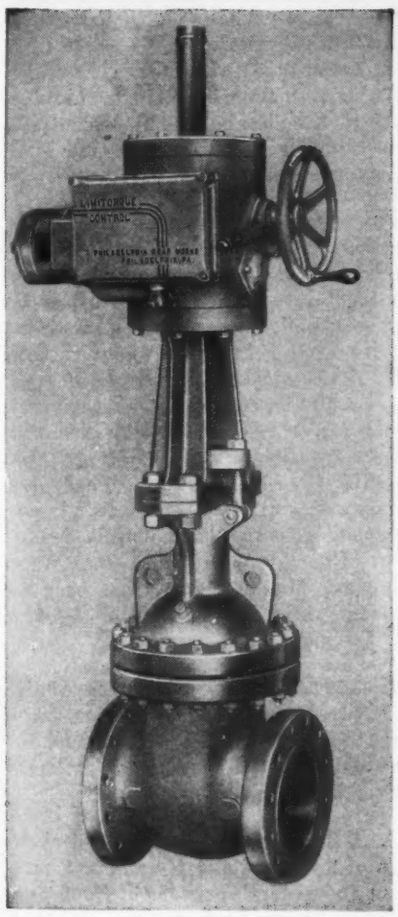
▶ GEORGE A. HALL has been made a lighting engineer in the central division of Central Maine Power Co., at Augusta, following 51 months' war service. Mr. Hall was educated at Brooklyn Polytechnic Institute and before World War II was employed in New York by the Westinghouse International Co.

▶ HOWARD FAILMEZGER, factory manager of Victor Insulators, Inc., Victor, N. Y., has been elected a director and also assistant vice-president of the company.

▶ WILLIAM S. MAJOR has been appointed development engineer for Bituminous Coal Research, Inc., Pittsburgh, Pa. Well known in the power field after 20 years of service with American Engineering Co., manufacturers of industrial stokers, Mr. Major will be responsible for promoting various BCR research projects that have progressed far enough to justify commercial trial or use. He also will be concerned with the development of large-scale equipment utilizing bituminous coal and with research projects designed to develop compact automatic coal-fired industrial boilers. In the course of his association with the American Engineering Co. he supervised district offices and agencies, prepared sales manuals as well as analyses and reports on fuel economies for industrial power plants, conducted sales engineering conferences and carried on market research on power plant trends.

▶ L. B. CHUBBUCK, formerly assistant chief engineer, Canadian Westinghouse Co., Ltd., Hamilton, Ont., has been appointed consulting engineer of the company. Mr. Chubbuck spent nine years with the Westinghouse Electric Corp., East Pittsburgh, Pa., on general switching equipment before his transfer to the Canadian company in 1909 as engineer in charge of switching equipment and in this position he was among the pioneers in the development of metal-clad switchgear. He was appointed assistant chief engineer in 1936. Mr. Chubbuck is the

DEPENDABLE VALVE OPERATION



with *Limitorque* VALVE CONTROLS

The Type "SM" Limitorque Valve Operator (shown at left) is designed especially for valves working at low to medium temperatures, low to high pressures, and normal speed of operation.

This Unit is mounted on top of valve yoke . . . no extra gears, nuts or bearings required. Stem nut is inside and furnished with Limitorque Unit. Nut is directly inside worm gear which drives it. (All clutches and connecting sleeves are eliminated.)

The Limitorque is designed for plug, cock, gate and globe valves. . . . Entire Unit and nut can be lifted off valve yoke, by removing flange bolts, and without disturbing wiring.

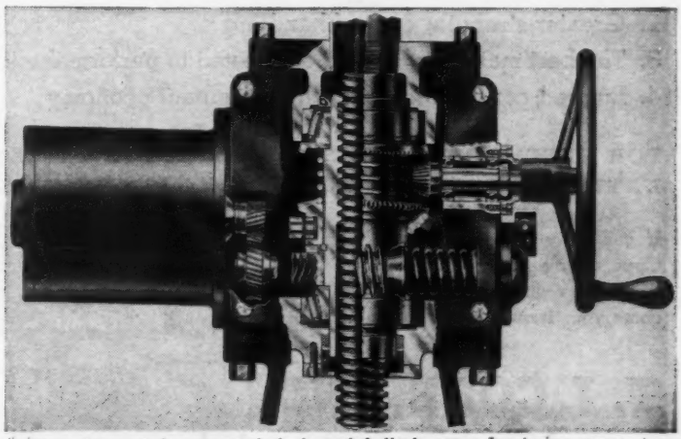
A special high starting torque motor, reduction gears, limit switches are all in one weatherproof assembly, — and all electrical connections are made to one terminal board, easily accessible by removal of watertight cover. . . . Heat treated helical gears and hardened, ground and polished worm and bronze worm gear are used.

A handwheel is provided for manual operation and does not revolve during motor operation. During hand operation motor is mechanically disengaged. The Limitorque is always operative electrically. There is no danger to operator should he be turning handwheel when motor is started, since automatic clutch disengages handwheel instantly, without shock. Declutch lever changes from motor to hand operation. The usual Limitorque "hammerblow" device allows motor to reach full speed before load is engaged. This imparts the "hammerblow" necessary to unseat sticking valve.

Torque seating switch insures tight valve closure without strain on valve parts. Protection from damage due to a foreign object obstructing closing is provided, because motor is shut off by thrust exerted on valve disc. Valve is protected during entire closing operation.

FEATURES OF THE "SM" TYPE LIMITORQUE

1. Micrometer torque seating switch.
2. Self contained unit — no gears, nut or bearings to buy.
3. Weatherproof, dust-tight and watertight construction.
4. Hammerblow device.
5. Non-rotating handwheel built into the unit.
6. Automatic declutching.
7. One terminal board for all electrical connections.
8. High torque motors.
9. Simple valve yoke.



Motor is coupled to worm shaft through helical gears. In closing, worm drives worm gear until lugs on the gear meet matching lugs on clutch. Torque is transmitted to the nut through splines connecting the clutch to stem nut. Torque spring is then compressed by axial movement of worm on worm shaft. When torque spring has been compressed to predetermined setting, torque switch is actuated by a tripping collar on worm shaft. This interrupts current to holding coil of controller and stops motor. Inertia of motor is absorbed in further compression of the torque spring. Opening travel is governed by geared limit switch.

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Suppliers of underground cable installation equipment for over fifty years.

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3. The best materials, treated and tested to perform the job
4. Rugged construction, long life, resultant economy

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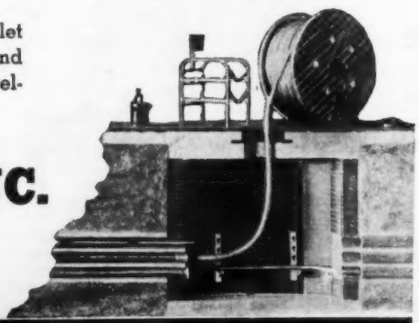
If you have a particular problem let Cope engineers work with you to find the most equitable solution. We welcome your inquiries.



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author of several papers on switching equipment, is a past-chairman of the Toronto section of the American Institute of Electrical Engineers and was vice-president of that association for 1931-33.

▶ BENJAMIN O'SHEA has retired as chairman of the board of directors of Union Carbide & Carbon Corp. He will continue as a director and a member of the executive committee. The office of chairman of the board has been abolished with Mr. O'Shea's retirement. Mr. O'Shea has been associated with the corporation since its formation in 1917. In addition, since 1898, he has held many official positions with Union Carbide Co. and other subsidiary companies.

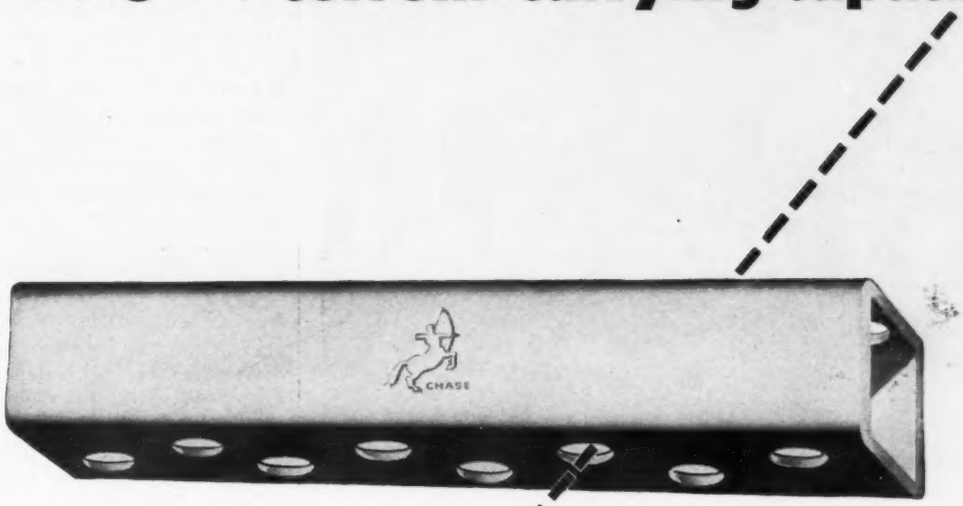
▶ JOHN MAY, vice-president in charge of sales, American Steel & Wire Co., Cleveland, has been appointed assistant to the president to aid in general commercial and sales policies. Mr. May is succeeded by HARRY M. FRANCIS, who has been elected vice-president in charge of sales. Mr. Francis has been assistant vice-president. Mr. May's service with the company dates back to 1909 and Mr. Francis' to 1915. B. M. ASHBAUCHER has been appointed manager of the electrical, wire rope and construction materials department of the New York sales office of the company. Mr. Ashbaucher has been associated with American Steel & Wire Co. for more than six years.

▶ HERBERT L. LAUBE, export executive and vice-president with Carrier Corp. since 1927, has been elected president of Remington Corp., makers of packaged air-conditioning equipment.

▶ J. S. TATMAN has been elected chairman of the board and JOHN AVERY president and general manager of Roots-Connersville Blower Corp., Connersville, Ind. Mr. Tatman has been with Roots-Connersville since his graduation from Purdue University in 1902. He is a vice-president of the Compressed Air & Gas Institute. Mr. Avery, well known for his activities in centrifugal compressor engineering for the past 22 years, was graduated from the U. S. Naval Academy in 1923 and then joined the engineering staff of General Electric Co. In 1926 he became a project engineer for American Brown Boveri Co. Before becoming president of Roots-Connersville, Mr. Avery was manager of the blower and compressor department of Allis-Chalmers Mfg. Co., Milwaukee.

▶ DONALD R. EDGE, formerly assistant rural lines sales manager of the Graybar Electric Co., has been promoted to the position of rural lines sales manager, with headquarters in Chicago. He succeeds K. B. MAYER, who is retiring. Mr. Edge has been intimately connected with Rural Electrification Administration ac-

For HIGH current-carrying capacity...



CHASE ventilated Bus Conductor

NOTICE the ventilating holes in top and bottom faces of this Chase Copper Bus Conductor. They provide internal cooling by *natural convection,* which increases current-carrying capacity.

The one-piece square copper tube, first developed commercially by Chase, gives great mechanical strength in all directions... simple one-piece construction saves installation time and labor.

When such features are combined with the basic advantages of *copper,* you can understand why electrical engineers prefer Chase Bus Conductors for AC bus installations.

The Chase Electrical Handbook contains complete information on Square Tube and other Chase Bus Conductor forms. For your copy, write (on company letterhead) to Dept. EW-56.

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This is the Chase Network—handiest way to buy brass

ALBANY† ATLANTA† BALTIMORE BOSTON CHICAGO CINCINNATI CLEVELAND DETROIT HOUSTON† INDIANAPOLIS KANSAS CITY, MO.† LOS ANGELES MILWAUKEE MINNEAPOLIS NEWARK NEW ORLEANS NEW YORK PHILADELPHIA PITTSBURGH PROVIDENCE ROCHESTER† SAN FRANCISCO SEATTLE ST. LOUIS WASHINGTON† *(†Indicates Sales Office Only)*

STRAIGHT
AS A HELICOPTER FLIES!

● If you live near a large city, how long does it take you to reach the airport through traffic from mid-town? Or if your home is in a smaller town, how much time do you lose in getting to a point on one of the air lines? Fortunately, *helicopter* feeder-taxi service is being developed as the solution to these difficulties.

A notable flight is recorded in the picture above—the first direct helicopter trip from Philadelphia's Southwest Airport to a roof in the center of that city. Mail was picked up and delivered to a waiting Europe-bound air liner. The distance this helicopter flew is 4 miles. The flight took 4 minutes. By city streets the trip is 8 miles—*and takes 25 minutes!* Yet Philadelphia is fortunate in having its airport much nearer mid-town than most cities.

A helicopter takes off and descends vertically. Its landing area need be no larger than a tennis court. Its cruising speed, *straight across country*, is about 90 miles an hour.

Kellett is the oldest manufacturer whose aircraft design-production program is exclusively in the helicopter field. We now plan to offer air travelers large, dependable, 10 passenger helicopters. They will save you time *and money* in getting to air line points from which you may wing around the world—or to the state capital—on the regular air transport lines, which give you speed and service with safety.

Kellett is a Contract Manufacturer, too, making such products as deep freeze units, metal tanks and assemblies, electrical units and agricultural machinery and aircraft parts.

KELLETT AIRCRAFT CORPORATION, NORTH WALES, PA.

KELLETT
HELICOPTERS

tivities since 1936, having managed the Union Rural Electric Cooperative in Marysville, Ohio, which he left to organize and later manage the Central Electric Cooperative, Inc., at Parkers Landing, Pa. This background of experience coupled with four years association with the General Cable Corp. especially qualifies Mr. Edge for his new work.

▶ JESSE W. POMAZAL has been named sales engineer in charge of all sales activities of Kurz & Root Co., Appleton, Wis. Mr. Pomazal has been with the company since September, 1945, in the engineering department, and prior to that time, was in the engineering department of Louis-Allis Co., Milwaukee, Wis.

▶ S. K. WOLF has been appointed manager of the new consumer products division of the Federal Telephone & Radio Corp., domestic manufacturing affiliate of the International Telephone & Telegraph Corp. Mr. Wolf recently completed two years' service in the Army Air Forces. Prior to joining the Army, he served on WPB as deputy director of the radio and radar division. Previously he was president of his own company, Acoustic Consultants, Inc.

▶ COL. GEORGE C. PRICE has returned to the presidency of the Electrical Manufacturing Co., Battle Creek, Mich., manufacturers of pole-line hardware. HAYDEN LOCKHART, who managed the company during the four years Mr. Price was in the Army, continues as secretary of the firm.

▶ G. J. IRWIN, formerly chief engineer, Philco Corp. of Canada, Toronto, Ont. is now engineer, radio division, Canadian General Electric Co., Ltd., Toronto. Mr. Irwin is vice-chairman of the engineering committee of the Radio Manufacturers' Association of Canada, coordinator of the Canadian Radio Technical Planning Board, and a representative of the radio industry on the main committee of the Canadian Standards Association.

▶ F. H. KILBERRY has been appointed executive vice-president and director of the Nordberg Manufacturing Co., Milwaukee, to fill the vacancy created by the resignation of C. E. Stryker, who has become president of the Adel Precision Products Corp., Burbank, Calif. Mr. Kilberry was formerly president of the Atlas Imperial Diesel Engine Co., Oakland, Calif., and has been associated with the Nordberg organization since 1945.

▶ A. C. URFFER has been appointed director of industrial relations of the Federal Telephone & Radio Corp., Newark, N. J. Mr. Urffer joined Federal Telephone in 1944 after extensive experience in various phases of industrial management. He previously had been associated

3 of the 18 METROPOLITAN ELECTRICAL UNITS IN THE LINCOLN TUNNEL

Complete Electrical Control by

At the right are listed various types of electrical control equipment designed and furnished by METROPOLITAN for utilities, industrial plants, large mercantile establishments, and public buildings. Your inquiries are invited.

Knife Switchboards
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SYNTHETIC TREATED
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Combining maximum flexibility with temperature resistance up to 400-425° F... Built to meet or exceed VTA or ASTM specifications or to your specification. Available in colors. Any lengths from an inch to a mile!

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Lacquer and Varnish Coatings

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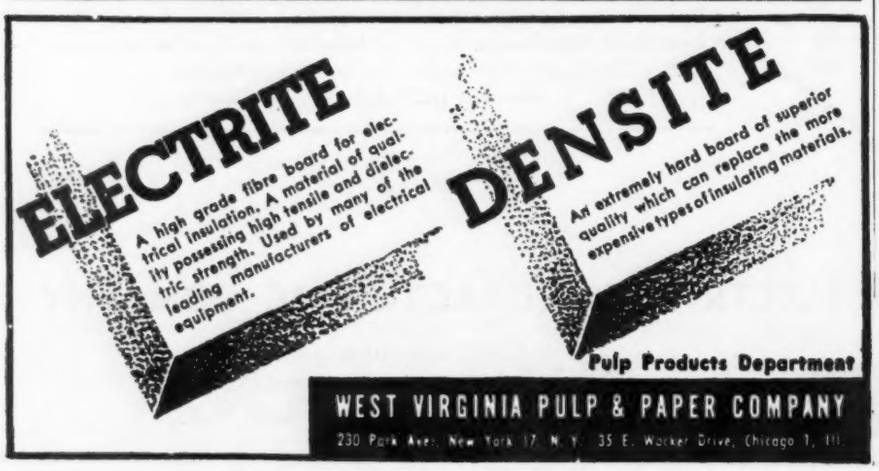

ELECTRITE
A high grade fibre board for electrical insulation. A material of quality possessing high tensile and dielectric strength. Used by many of the leading manufacturers of electrical equipment.
DENSITE
An extremely hard board of superior quality which can replace the more expensive types of insulating materials.
Pulp Products Department
WEST VIRGINIA PULP & PAPER COMPANY
230 Park Ave., New York 17, N. Y. 35 E. Wacker Drive, Chicago 1, Ill.

with the management consulting firm of Stevenson, Jordan and Harrison, New York, and before that was an engineer with the General Electric Co.

OBITUARY

▶ R. K. PETERS, who was appointed manager of the Los Angeles Appliance Service Center of the General Electric Co. in March, died on May 4 in Los Angeles after a short illness. He was 34 years old. Mr. Peters became associated with the company in 1929.

▶ LEONARD P. HEATH, who was connected with the engineering department of the Puget Sound Power & Light Co., Seattle, died suddenly on May 7. He was 49 years of age.

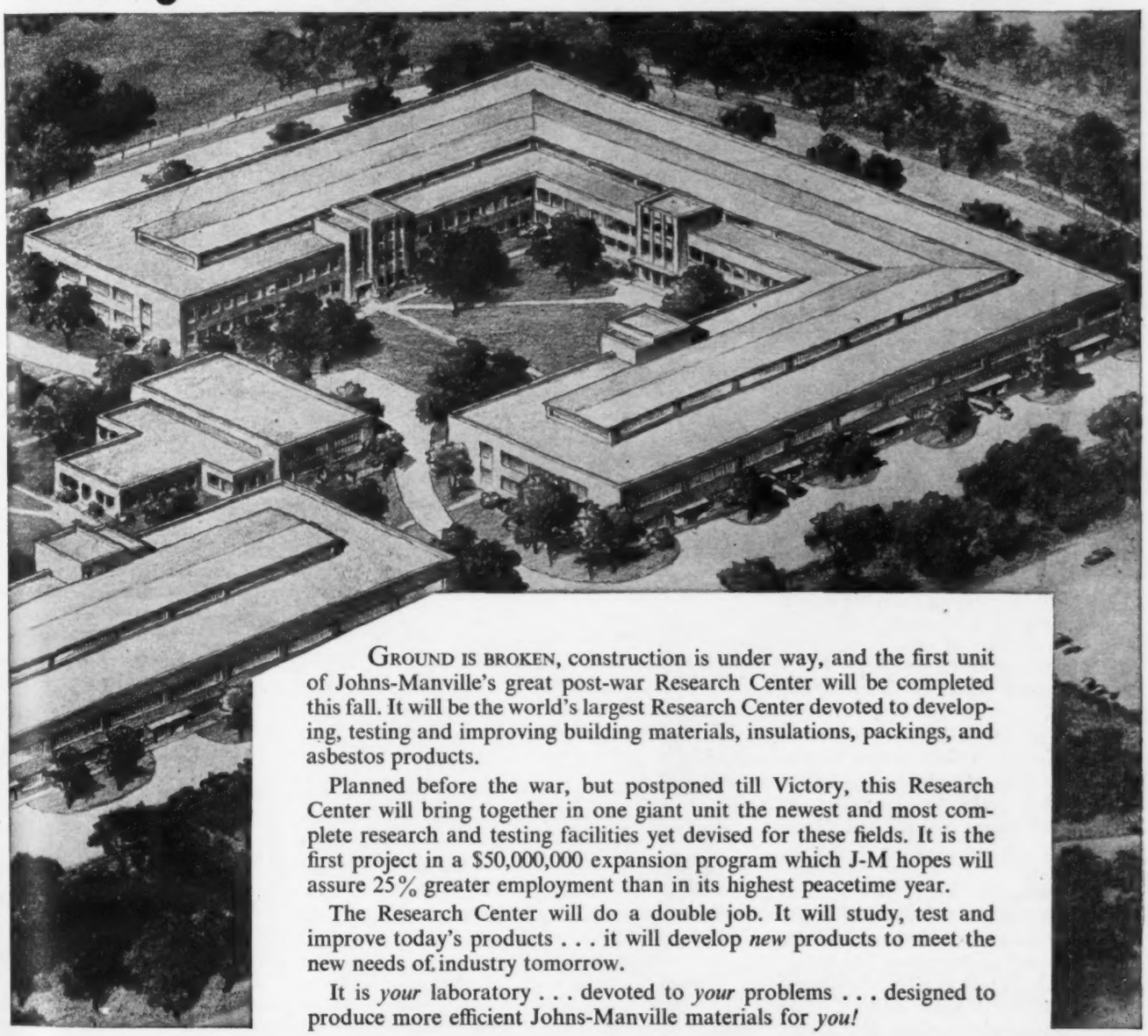
▶ WILLIAM H. OVIATT, for many years general superintendent of the former Narragansett Electric Lighting Co., Providence, R. I., died recently at an advanced age.

▶ CEDRIC J. WALKER, 45, supervisor of insurance for the New England Power System, Boston, Mass., died at Wellesley, Mass., on May 8. He joined that public utility group after being graduated from Worcester Polytechnic Institute in 1924, and was connected with the electrical engineering department before assuming his late duties.

▶ S. B. HOOD, for many years associated with the electrical industry, died on March 9 at his home in San Leandro, Calif. He was 70 years of age. Mr. Hood was well known in the industry through his advocacy of grounded-neutral systems, and particularly through the development of the "common-neutral system" of distribution which became extensively used in Canada, where he made its initial development during his eight years with the old Toronto utilities, and then in the United States. He was born in Philadelphia and early in his career was in charge of outside construction work in various capacities for Philadelphia Electric Co. from 1896 until 1906. He then went to Toronto as superintendent of distribution for the old Toronto Electric Light & Power Co. In 1916 he joined the Northern States Power Co., Minneapolis, taking charge of distribution and transmission construction and operation. It was in this connection that he perfected the "common-neutral system" which he had initiated in Canada. During his association with the Northern States Power Co., Mr. Hood was a frequent contributor to ELECTRICAL WORLD. In 1927 he left the Minneapolis utility to take up residence in California. He was retained as a consultant by the James R. Kearney Corp. up to the time of his death.

Expansion Program

to include World's Largest Research Center for Building Materials and other Industrial Products



GROUND IS BROKEN, construction is under way, and the first unit of Johns-Manville's great post-war Research Center will be completed this fall. It will be the world's largest Research Center devoted to developing, testing and improving building materials, insulations, packings, and asbestos products.

Planned before the war, but postponed till Victory, this Research Center will bring together in one giant unit the newest and most complete research and testing facilities yet devised for these fields. It is the first project in a $50,000,000 expansion program which J-M hopes will assure 25% greater employment than in its highest peacetime year.

The Research Center will do a double job. It will study, test and improve today's products . . . it will develop *new* products to meet the new needs of industry tomorrow.

It is *your* laboratory . . . devoted to *your* problems . . . designed to produce more efficient Johns-Manville materials for *you!*

Manufacturers of 1200 Products for Home and Industry

MANUFACTURERS & MARKETS

Pole Association Hears Demands Have Tripled

Output Nearly 3 Million per Year—REA Calls for 3 Million Through 1950—Creosote Short

Pole requirements of the nation have tripled in the face of diminished supplies of creosote preservative. REA needs alone in 1946 will equal the wood-preserving industry's average pole output in a normal year. These facts were presented at the 42nd annual meeting of the American Wood-Preservers' Association held in Cincinnati recently.

Present construction plans of Rural Electrification Administration cooperatives call for three million poles yearly through 1950, E. R. Smith, chief, pole requirements staff, REA, Washington, D. C., reported. Wood-preserving companies produced 2,993,823 poles in 1944, the latest year for which official figures are available. Association members point out that normal commercial needs have doubled due to a backlog of maintenance and long-planned expansion programs.

Creosote Shortage

Unless Great Britain allows coal-tar creosote to be exported to the United States, wood-preserving operations will be hampered by a shortage of at least 20 million gallons of creosote in 1946, J. F. Linthicum, president of the American Lumber & Treating Co., Chicago, announced.

"Users are operating on a hand-to-mouth basis and any interruption of shipments from distilleries because of strikes in the steel or coal industries, or for any other reason, causes immediate shutdown threatening the loss of large inventories of forest products in storage for seasoning. An adequate supply is absolutely essential as there is no comparable substitute for creosote in the preservation of poles, ties, and marine piling," he said.

Releasing the text of a letter addressed to John D. Small, head of the Civilian Production Administration, Mr. Linthicum pointed out that prior to passage of the Lend-Lease bill, "England exported creosote and imported fuel oil, utilizing the same tankers. A favorable trade balance was thereby created. After Lend-Lease (March, 1941) England abruptly curtailed creosote exports, which action leads to the obvious conclusion that England felt relieved of any obligation to pay for fuel oil so it decided to reserve its supply of creosote for use as fuel also."

No imported creosote has come into this country since early 1942, he explained. Creosote requirements of the United States have been partially supplied from foreign sources for many years and normal imports from 1931 through 1940 averaged 39,668,062 gallons annually or 27.7 percent of total consumption, the greatest part coming from England.

"During the war years domestic steel and coke production increased with a corresponding increase in creosote production. At the same time railroad, utility, and industrial construction requiring creosote decreased and the domestic creosote supply was almost equal to the demand. The result was, however, that creosote inventories were gradually reduced and by the end of 1945 the bottom of the barrel had been reached," Mr. Linthicum said.

"With the termination of hostilities, it was anticipated that England would resume the exportation of creosote but to date export licenses have been unobtainable. We believe that England is fully aware of the important part that creosote plays in our domestic economy and of their own strategic position so the problem then becomes one for our State Department to solve," he stated, in urging the government to correct the situation at the earliest possible date.

•

Several Electrical Firms Assist in UN Hookup

The audio facilities system installed in the United Nations Security Council Chamber at Hunter College for picking up and distributing the proceedings of the meetings has been termed one of the most complex sound systems in the world.

The central point of the system is the master control, located in a booth on one side of the chamber, from which the entire assemblage is visible. All speech is picked up on the floor by 20 microphones, passed through the 44- x 16-in. master panel in the booth and can then be fed, collectively or individually, to 48 points simultaneously. From the master panel it is distributed to the 30 loud speakers of the public address system, to television and newsreel booths and to the interpreters' headphones.

Sound is also fed to ten broadcasting booths in the chamber, and through them to the radio networks of the country and individual stations, as well as to short-wave broadcasting stations for world-wide distribution.

Six separate channels carry the sound to a room in the basement of the building, where permanent recordings are made by a group of army technicians, under the supervision of Maj. G. Robert Vincent, of the Signal Corps. The Radio Section of the UN Department of Information has just announced that transcriptions of the proceedings of the Council will soon be made available to all radio stations.

The sound system, which was built in twelve days by The Langevil Co., conforms to the FM requirements of the Federal Communications Commission. The noise level of the system is 63-65 db. below the program level. There are about 15,000 individual connections in the installation and coaxial cable is used throughout the entire system, which was so constructed as to allow easy change of location should the Council move to another temporary headquarters.

Several firms cooperated in the difficult job of completing the installation in time for the first session of the Council by interrupting normal production to produce the special material required for such a comprehensive and complex sound system. These firms included Whitney-Blake, C. P. Clare Co., Western Electric Co., and the Audio Development Co.

•

Promotional Plan Launched by Electric Truck Group

Convinced that industry's best post-war chance to cut manufacturing and distribution costs of consumer products, thereby creating more jobs and widening markets, lies in mechanizing its handling of materials, the Electric Industrial Truck Association has embarked for 1946 on a broad program to promote interest in the economics of the idea and to prove that the battery-powered truck belongs in that picture on the basis of performance.

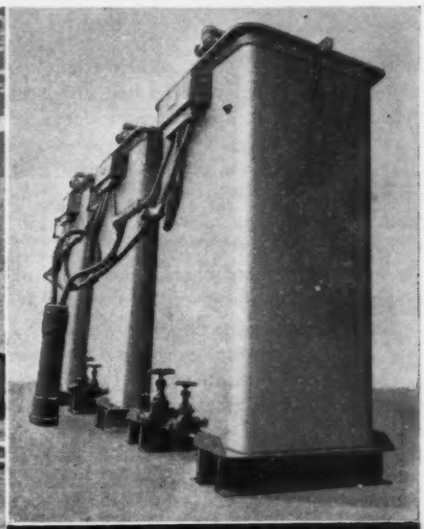
According to Gordon J. Berry, Cleveland, president of the Association, the evidence at hand establishes the fact that greater use of electric trucks in post-war

ACRES of VOLTAGES

distributed to critical chemical processes

by

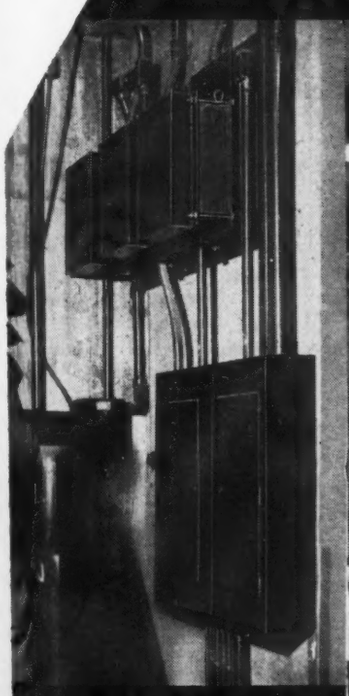
AMERTRAN TRANSFORMERS



Three 150 KVA single phase AmerTran Power Transformers. 2300-440 V.

600 KVA O.I.S.C. AmerTran Power Transformer. 3 phase, 2300-440 V.

GENERAL ANILINE AND FILM CORPORATION
GRASSELLI, NEW JERSEY



Three AmerTran Dry Type Transformers, used in load balance circuit. Single phase, 440-220 110 V., 25 KVA. Other AmerTran Dry Type units are used for lighting and at-the-load power.

Two heavy Duty AmerTran Transtats, providing precise AC voltage control for laboratory processes. (There are many more Transtats in this plant.)

Miles of distribution lines cover the many acres of plant operations at the huge Grasselli, New Jersey works of this corporation. The first AmerTran installation went into service many years ago. It is on the job today, supported by many other AmerTrans throughout the property. These units range from the main power transformers down through the various ratings of distribution types—to the compact, troublefree, "at-the-load" dry type AmerTrans.

If continued buying means satisfaction, we'd say that AmerTrans are doing a pretty satisfactory job for this busy company. In fact, they told us so!

AMERTRAN

MANUFACTURING SINCE 1901 AT NEWARK, N. J.

Pioneer Manufacturers of Transformers, Reactors and Rectifiers for Electronics and Power Transmission

AMERICAN TRANSFORMER CO. 178 Emmet St., Newark 5, N. J.

mechanization will help greatly to reduce economic waste and thereby help industry to provide "more jobs for more people" through more goods and lower prices.

First steps in embarking on the new program will include correlation by the member manufacturers of trucks, batteries, and battery chargers of all available economic facts on material handling systems; creation of visual and other educational helps; preparation of advertising directed to industry to prove the value of electric trucks; and publication of specific case stories portraying the experience of large and small plants in meeting the materials moving and storage problem.

•

Double Expansion Program for Plastics Production

An expansion program to more than double manufacturing facilities for Geon polyvinyl resins has been announced by W. S. Richardson, president of B. F. Goodrich Chemical Co.

"These enlarged facilities for the production of polyvinyl chloride and related plastic raw materials are a part of a long-range plan to enable users to keep pace with their expanding requirements.

"A portion of the new output will be available during the summer of this year and the balance of the facilities will be in production early in 1947," Mr. Richardson said.

Geon resins are now employed in the manufacture of plastics which are widely used as insulation for wire and cables.

Distribution Equipment to Go on Utility Tour

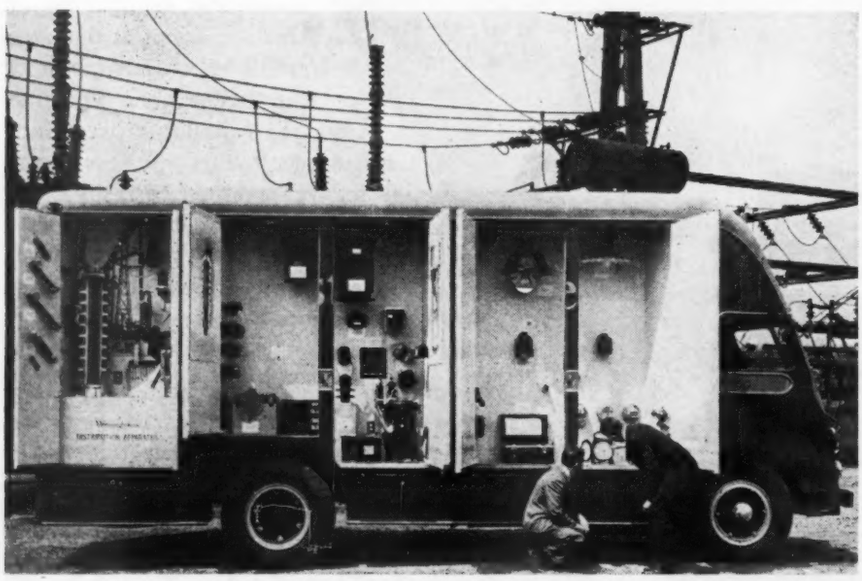
E.E.I. engineering committee men, meeting in Chicago recently, were given an advance showing of the new electrical distribution equipment demonstration truck that Westinghouse will shortly send on a twelve-month road tour of public utilities, REA's and municipal utilities.

The truck is equipped with the latest gear for the operation and protection of power distribution lines from source to customer set-up to simulate operation of a representative five or ten miles of 2,400-volt power line. This simulated line is mounted on crossarms and insulators against a scenic background over 35 ft. long. It is complete with disconnect switches, boric acid fuse, automatic-reclosing pole type breaker, step-voltage regulator, CSP distribution transformer, lightning protective devices and primary shunt connected capacitor. Even automatically operated tree branches are provided to cause line troubles when wanted (if ever). Also, there is a 100,000-volt lightning generator to produce flashovers on the line while it is energized at operating voltage. Fault currents heavy enough to operate fuses and breakers under severe conditions are delivered by a specially designed motor generator set with a heavy fly-wheel. Coordination of fuses and reclosers can be shown graphically under any type of fault or overload conditions.

Power for the demonstration can be taken from any convenient outlet supplying 60 amp. at 110 volts a.c.

Other exhibits on the truck provide cutaway views of line protection apparatus to aid distribution devices and an assortment of street light heads and reflectors, meters, and other equipment.

TRAVELING POWER LINE—Full size distribution equipment arranged to simulate operation of an actual 2,400-volt power line has been mounted on this demonstration truck



FIVE MILES IN 35 FEET — A complete working distribution line equivalent to all the equipment usually found in a circuit of five miles or more has been compressed into 35 ft. in the electrical distribution equipment demonstration truck soon to tour the country

•

Square D Constructing New West Coast Building

Square D is building a new West Coast division plant in Los Angeles for the manufacture of control and electrical distribution equipment to replace the one now in operation, F. W. Magin, president, has announced.

The new one story plant of brick, concrete and steel construction will expand by 60 percent the present facilities, Mr. Magin said. Construction is progressing as necessary building materials become available under current regulations. The present Los Angeles plant at 1320 East 16th Street will be disposed of.

"The continued rapid growth of industry on the west coast indicates a rapidly expanding market for capital expenditure equipment in the Square D line," Mr. Magin said, "and our enlarged assembling and manufacturing facilities will make it possible for us to better meet this increased demand. With industrial expansion will come residential expansion and we have a number of pieces of equipment, such as Multi-breakers, which are becoming standard items in home building specification."

J. H. Pengilly, vice president of Square D, is general manager of the West Coast

BLAW-KNOX TRANSMISSION TOWERS

BLAW-KNOX DIVISION OF BLAW-KNOX COMPANY • 2013 FARMERS BANK BLDG., PITTSBURGH, PA.

NEW YORK CHICAGO PHILADELPHIA BIRMINGHAM WASHINGTON

division. He recently returned to the company after wartime service as a colonel of engineers.

•

Manufacturers Announce New Sales Assignments

Electrical manufacturing companies have recently made the following appointments to their sales staffs:

METROPOLITAN DEVICE CORP., Brooklyn, N. Y., has appointed I. E. Cope & Co., Thomas Building, Dallas 1, Tex., as agent for the Texas area. The Southwest Sales & Service Co., 310 Commercial Bank Bldg., Shreveport 24, La., has been named agent for the states of Louisiana, Arkansas, Mississippi and the western portion of Tennessee. S. T. Schoolar & Co., 5 Shockoe Slip, Richmond 19, Va., has been made agent for Virginia, with portion of North Carolina and portion of West Virginia.

ELECTRIC STORAGE BATTERY Co., Philadelphia, has appointed John W. Weigt as manager of its New York branch, with headquarters at 23-31 West 43rd St. Mr. Weigt succeeds D. P. Orcutt, who retires after 36 years' service with the company. Mr. Weigt entered the employ of the company in 1920. He is a member of the American Institute of Electrical Engineers, past-president of the Society of Terminal Engineers and past-president of Eta Kappa Nu (honorary electrical engineering fraternity).

E. INGRAHAM Co., Bristol, Conn., has named J. J. Kelly district manager in charge of the Middle Atlantic territory with headquarters in Philadelphia.

MITCHELL MANUFACTURING Co., Chicago, has appointed Herbert M. Rose as sales representative for the Pittsburgh-West Virginia territory. Before entering military service, Mr. Mitchell was district manager for southern California.

Manufacturers Make Plant Expansion Plans

Many electrical manufacturing companies have recently announced plans for the expansion of plant capacity.

John A. Roebling's Sons Co. of Illinois announces that work is already well underway for the erection of a modern office building and warehouse. The new building has been designed with provision for future expansion, and is located at 5525 West Roosevelt Road, Chicago.

Completion of negotiations for the purchase of the Air Products, Inc., Chattanooga, Tenn., plant and transfer of title from the War Assets Administration, has been announced by Howard E. Blood, president of the Norge division of Borg-Warner Corp. The new plant will be employed for the production of a new-type hermetic compressor unit to be used in household and commercial refrigerating devices. The plant's operations will be under the supervision of O. H. Shenstone, manager of the Muskegon factory, but Theron F. Gifford will be Chattanooga manager. Mr. Gifford formerly was assistant manager in Muskegon.

All Canadian manufacturing and sales operations of the Minneapolis-Honeywell Regulator Co. have been moved to a new plant at Leaside, Ont., on the outskirts of Toronto. The new factory, which during the war built gunsights and fire control instruments, is now employing 250 persons in making and assembling the major share of the company's production for the Canadian market. W. H. Evans, general manager for Canadian operations, is in charge of the new plant.

Weston Electrical Instrument Corp., Newark, N. J., will expand its manufacturing plant on Frelinghuysen Ave. by the erection of a building with approximately 70,000 sq. ft. of floor space. The building, for which CPA approval has been secured, will furnish additional space for manufacturing and related activities of the company.

H. O. Canfield Co., Bridgeport, Conn., has announced the opening of a West Coast sales office. H. G. Staley, formerly sales manager of a midwestern supply company, has been appointed West Coast sales manager.

General Electric Co. is installing machinery in a former war plant at Scranton, Pa., for the production of electric sinks and electric dishwashing units, the Pennsylvania Department of Commerce has announced. General Electric has purchased from the government the plant occupied during the war by Western Electric Co. It is reported that 350 workers will be employed in the company's initial operation and that an equal number will be added later.

Western Electric Co. has leased for three years the Fairchild Aircraft plant at Burlington, N. C., with an option to purchase. The company is negotiating for the lease or purchase of the National Carbon plant at Winston-Salem, N. C., it is announced.

An addition to the present plant building of the Lenk Manufacturing Co., Newton Lower Falls, Mass., is nearing completion and will soon be providing needed space for extra production. Col. D. Allen Lenk, president and general manager, stated the addition to present plant facilities is the initial step in a post-war expansion program.

•

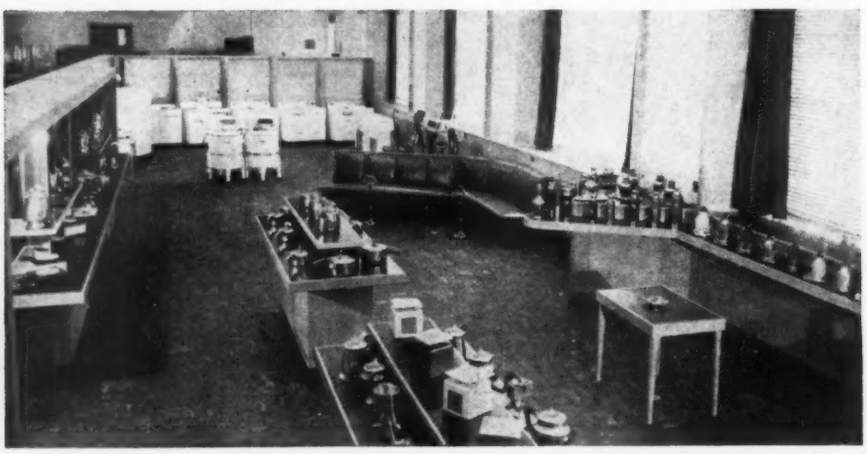
Will Use Co-Op Outlets

Retail outlets operated by cooperatives, granges and other farm organizations will be used by Carrier Corp. to market its 1946 food freezers in agricultural areas. While the freezers will be sold by Carrier's 4,000 regular dealers, additional rural-area sales coverage is provided by an agreement with the United Co-operative of Alliance, Ohio, representing farm groups with a total membership of 1,300,000 families.

•

Buys Howard B. Jones Co.

The Cinch Manufacturing Corp. has purchased the Howard B. Jones Co. of Chicago, manufacturers of electrical connecting devices. This plant will be known as the Howard B. Jones Division, and will continue its present manufacturing lines. Cary Wilson, Cinch vice-president, will head the new organization as general manager.



BEAUTY & UTILITY—Beauty combined with utility is aptly brought into focus in the Landers, Frary & Clark newly designed display room which was recently opened in New Britain, Conn. Electric ranges are featured against the panel design which gives them an individual as well as mass display effect. Washers and traffic items round out the display of the load building line

Presenting the 1946 edition of the

McGRAW CENTRAL STATION DIRECTORY

This latest, most accurate coverage of postwar changes in electric utility operations and personnel is published for those who work in or sell to the electrical utility industry.

The 1946 edition of the McGraw Central Station Directory, now ready, lists in one compact volume every discoverable change in the electric utility industry during the past 12 months. Changes in personnel and operations up to April 1, 1946 and other exclusive data on organization, areas served, generation and distribution equipment are included for each of 4,000-odd utility plants in the U. S., Canada and U. S. possessions.

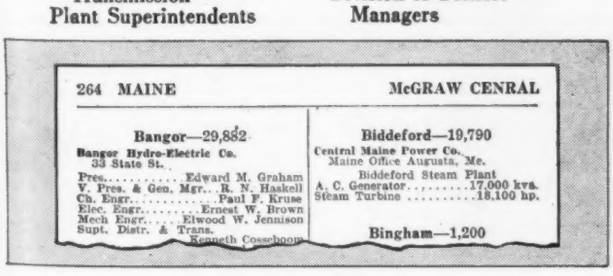
Facts Presented:

1. Names and addresses of private and municipally operated electric light and power companies in the U. S., Canada, and U. S. possessions; also government-controlled projects.

2. Names and addresses of affiliated, holding, controlling or managing and service companies with complete lists of properties controlled or managed by each, and including names and addresses of principal officials.

3. Names and addresses of officials and chief operating men for all operating companies, including:

- Presidents
- Vice Presidents
- General Managers
- Superintendents of Distribution
- Mechanical Engineers
- Commercial or New Business Managers
- Superintendents of Transmission
- Plant Superintendents
- General Superintendents
- Purchasing Agents
- Division or District Superintendents
- Chief Engineers
- Electrical Engineers
- Plant Engineers
- Merchandising Managers
- Division or District Managers



264 MAINE — McGRAW CENRAL

Bangor—29,882

Bangor Hydro-Electric Co.
33 State St.
Pres.....Edward M. Graham
V. Pres. & Gen. Mgr...R. N. Haskell
Ch. Engr.....Paul F. Kruse
Elec. Engr.....Ernest W. Brown
Mech Engr.....Elwood W. Jennison
Supt. Distr. & Trans.
Kenneth Cossehoom

Biddeford—19,790

Central Maine Power Co.
Maine Office Augusta, Me.
Biddeford Steam Plant
A. C. Generator.....17,000 kvs.
Steam Turbine .....18,100 hp.

Bingham—1,200

Sample page of Directory.

REA Co-ops Listed:

REA co-operatives have been listed separately in the back of the Directory. This list includes new co-operatives formed during the past year.

Use by Utilities:

The directory is used by hundreds of utility executives who wish to know about:

1. The organization of other utilities, especially those in their own or adjoining areas.
2. Movements of officials from company to company.
3. Discernible trends in expansions of operations of other utilities.

Use by Manufacturers:

Manufacturers of electrical generating, transmission and distribution equipment, and manufacturers of general equipment and supplies, all serving the vast utility industry, make constant use of the directory for

1. Names and addresses of executive, supervising, managing and engineering officials.
2. Determining electrical characteristics of plant, equipment and lines now in use.
3. Knowledge of scope of operations: generating capacity, towns and number of meters served, etc.
4. For each operating company, the following information is presented:

- Company total and plant individual generating capacity in kva. or kw.
- Kind of prime mover and capacity in hp.
- Amount of power purchased in kw hrs.
- Type of current distributed, No. of wires, phase, voltage and cycle.
- No. of meters served.
- Location of power plants.
- Complete list of towns (of 500 population or over) served.
- A complete alphabetical index of companies listed.

Edition Limited:

Shortage of paper and binding facilities necessitates limiting the 1946 edition. Orders will be filled in order of receipt. The Directory is sturdily bound in flexible blue Fabrikoid, fully thumb-indexed, size—4½" x 8½". Price $25.00 per copy. 10% discount on 5 or more copies. For intelligent, productive planning and selling, a copy of the 1946 edition of the McGraw Central Station Directory should be in the hands of every executive responsible for such plans.

Send orders to

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McGraw-Hill Publishing Company
330 West 42nd Street, New York 18, N. Y.

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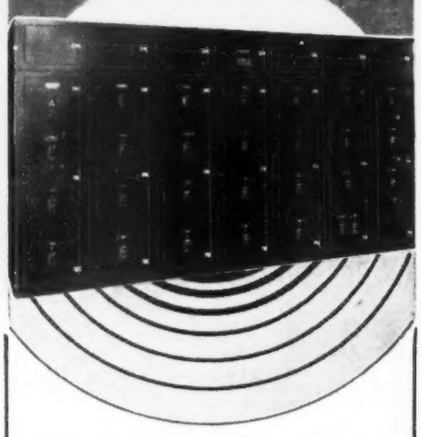

ENGINEERING SERVICE THAT'S UNUSUALLY HELPFUL. No matter how difficult your problems of design, our engineers have probably solved them . . . exceptional experience in planning every kind of switchboard and special panelboard. We take full responsibility for meeting all applicable specifications and requirements.

HIGHEST QUALITY, EXCLUSIVELY. The best of materials and skilled workmanship, backed by rigid engineering inspection. Every Pelham switchboard or panelboard is guaranteed to give completely satisfactory service.

DEPENDABLE DELIVERIES. Special switchboards are designed and built with unusual promptness. Our deliveries are made when promised.

Call your Pelham representative, or write or wire the factory.

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Erie, Pa.

SPECIALIZED DESIGN
Pelham
UNEXCELLED QUALITY

SWITCHBOARDS • PANEL BOARDS
SWITCH GEAR AND ACCESSORIES

FIELD REPORTS ON BUSINESS

Refrigeration apparatus, lighting fixtures and equipment for air conditioning are in demand. Small motor sales are steady, but shortages in copper and other metals are slowing down operations. Many new home freezer plants are being installed.

NEW ENGLAND

Applications for permits are flooding CPA offices in New England. Plant expansion and improvements in lighting and ventilation head the lists of applications which call for a wide diversification of electrical equipment. Perhaps in no previous period has the market offered so many sales openings, nor have stocks of equipment been so depleted or materials so scarce to take advantage of the abundant opportunities. Refrigeration apparatus, lighting fixtures, and equipment for air-conditioning are in demand; small motor sales are steady, prices firmer, but shortages in copper and other metals are slowing down operations in some plants.

Work is progressing in the construction of the Green River dam, Morrisville, Vt., where about 4 million kw.-hr. annually will be obtained. Construction cost, $675,000. Further down the river, at Cady's Falls, a new hydroelectric plant will use a Kaplan waterwheel with a Westinghouse 700-kw. generator operating under 39-ft. head. Chas. T. Main, Inc., Boston, are engineers.

Store and restaurant modernization is active in this district. Van Dyk's Coffee House, Hartford, Conn., has equipped 90 percent of its counter and cooking service electrically, amounting to 50 kw. in power load, and a West Hartford, Conn., drug store has installed 80-kw. connected load for all-electric counter service.

Simplex Wire & Cable Co., Cambridge, Mass., has booked two government orders for submarine telephone cable which total $124,650.

General Electric is seeking permission from CPA to install new lighting and air-conditioning systems at its West Lynn plant, and will provide new test apparatus there at a cost of $40,000.

NEW YORK

Effect of the near rail strike was one of checking truck routes and deliveries by manufacturers and distributors of electrical apparatus. Some of the manufacturers were prepared to continue shipments since trucks had been the usual method of shipping, but others who have relied on rail shipments were seeking information on the areas served by various truck lines.

Inventories continue to decline due mainly to coal and copper work stoppages. Inventories of wiring devices at distributor level are at critical stage. Conduits, fuses, fluorescent fixtures, wire and cable and light switching equipment continue to grow tighter with little or none coming into the market. Incandescent fixtures appear to be the exception with the fixtures remaining tight but being somewhat easier than in immediate past.

Utilities served by distributors in the New York area are reported to be ordering items for delivery in one year or more. One case was reported of a distribution department ordering cutouts of 50 and 100 amp. capacity for use on 5,7.5 and 15-kv. circuits for delivery in May and June of 1948.

Price rises of recently decontrolled apparatus are reported to have no affect upon the sale and movement of the equipment. One distributor stated that the utilities expected the rise. They are more concerned with the continued shortage of new apparatus and maintenance parts for the old apparatus.

CHICAGO

Electro-Motive Corp., division of General Motors, will erect a $2,000,000 power plant in Brookfield. A $100,000 transformer building is being built for an unnamed company at 1800 North Winchester Ave., Chicago.

FCC has granted Illinois Bell Telephone Co. the right to construct VHF transmitting stations in four cities—Chicago, Peoria, Springfield and Ottawa—to provide both radiotelephone service to vehicular traffic on the Chicago-St. Louis highway, and service to boats on the river between the two points. The highway transmitters will also give urban radiotelephone service for towns in their immediate vicinity and to vehicles within a radius of 50 miles of the transmitting point. To insure prompt relaying of calls originating from moving vehicles, about 25 receiving stations will be installed at intervals along the Chicago-St. Louis route. The project is to be completed in six months.

Illinois Bell has lowered its charges for constructing rural lines. Where no pole line is now available along public highways, the firm will build a line for three-quarters of a mile without charge; will continue the line free of charge where such extension results in an average of one customer for each three-quarters of a mile of pole line.

PACIFIC COAST

Increased railroad operating speeds, moving of appliance plants to the coast area, building of new processing plants and initial moves in the California Central Valley project were the high lights in the electrical trade news during the week.

Industrial developments include many new home freezer and cold storage plants. These are typified by such installations as the $1,000,000 jobs at Nampa, Idaho, and Ontario, Ore.; and the $1,500,000 construction at Modesto, Calif.

A $1,000,000 wheat and potato processing plant is planned for The Dalles, Ore., and the $782,000 contracts for electrical equipment and lines to serve this load were recently awarded.

California Central Valley project will require 215 miles of 795,000-cm. aluminum wire or its copper equivalent for the 230-kv. Oroville to Sacramento sector. The towers for this line will cost $473,545 and this contract has already been awarded to Bethlehem. Pump costs will be $696,721 and have been awarded to Worthington. Other immediate requirements are 38,000 insulators and 766,000 ft. of ½-in. ground wire.

Joshua Hendy has been awarded the contract for 14 size 96-in. outlet gates and requisite electrical controls for Shasta Dam. The project will soon require 7500-kva. regulating transformers for the substations, as well as breakers, disconnects, pumps and other apparatus for the 500-mile line between Shasta and Friant dam.

SALES OPPORTUNITIES

SOUTH DAKOTA — Northwestern Public Service Co., Huron, has preliminary plans in progress for expansion and improvements in steam-electric generating station at Mitchell, with installation of additional equipment. It is proposed to begin work early next fall. Cost reported close to $1,000,000. Plans also are being arranged for construction of new transmission line from Mitchell to Aberdeen, utilizing available increased power, estimated to cost approximately $650,000. Work on latter program is scheduled to be placed under way early in 1947.

IDAHO—King Hill Irrigation District, King Hill, plans new hydroelectric generating station on site near King Hill (Elmore County), with transmission lines to several distant points for power supply for pumping station service. Also, pumping machinery, controls and auxiliary equipment for new installations. Entire project estimated to cost $550,000. Plans will be prepared at once. Financing in part has been arranged through FWA.

TENNESSEE—Public Utilities Department, Sweetwater, plans extensions in primary and secondary lines in McMinn County for rural electrification. Franchise has been granted and work will be carried out soon. Cost estimated about $150,000.

MISSOURI—Pittsburgh-Corning Corp., 632 Duquesne Way, Pittsburgh, Pa., plans new plant on 40-acre tract of land near Sedalia, for manufacture of glass blocks and cellular glass products. It will comprise a number of one and multi-story buildings, with machinery and electrical equipment. A power house is planned, as well as machine shop and other utility structures. Project will be divided into two main sections, first to be carried out at present time and other at later date, entire development to cost about $2,000,000.

WASHINGTON — Bureau of Reclamation, Denver, Colo., will receive bids until June 14 for nine 2-kw. electric unit heaters, and thirty-seven 3-kw. similar heaters for Grand Coulee power plant, Columbia Basin project. Equipment will be installed by government (Specifications 1342); also, until June 7 for quantity of aluminum railings and curbs, with expansion anchors, fittings and complete accessories for Grand Coulee dam and power plant, same project. Materials will be installed by government (Specifications 1343).

KANSAS—Light and Water Department, Alton, plans improvements in municipal power plant. E. W. Goode, city engineer and manager of station, is in charge.

COLORADO—Bureau of Reclamation, Denver, will receive bids until June 7, for three 69,000-volt, single-pole, hook-operated, outdoor-type, expulsion-fuse, disconnecting switches; and for three single-pole, outdoor, thyrite or autovalve, station-type lightning arresters, designed for base mounting and suitable for use on three-phase, 69,000-volt, ungrounded-neutral circuit, for Granby pumping plant construction substation, Colorado-Big Thompson project. Equipment will be installed by government (Specifications 1335).

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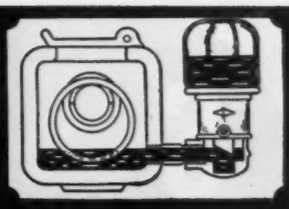

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Chillicothe, has authorized an expansion and modernization program at local mill, including paper-making division and consolidation of two present soda pulp mills into one main unit. Additional buildings will be erected. Machinery and electrical equipment will be installed. Project to be carried out over period of months is reported to cost in excess of $4,000,000.

OREGON — Bonneville Power Administration, Department of Interior, Portland, will receive bids until June 6 for construction of new power substation at Tillamook, as per plans and specifications on file.

TEXAS—At recent special election, voters at Austin, defeated a proposed bond issue of $770,000 for extensions and improvements in municipal power plant and electrical distribution system, and project will be held in temporary abeyance.

IDAHO—Bureau of Reclamation, Denver, Colo., will receive bids until June 5 for two 25 by 22 ft. radial gates, with rollers, pin bearings and accessories; and for two 40,000-lb. capacity, motor-driven, radial-gate hoists, for installation in spillway of Anderson Ranch dam, Boise project. Equipment will be installed by government (Specifications 1330).

CONNECTICUT—Connecticut Light & Power Co., Hartford, plans large new service building at Montville. Bids are being asked for structural steel framing and work is scheduled to be carried out at early date.

MARYLAND—Brooklyne Chemical Works, Inc., 9th St., Curtis Bay, Baltimore, plans new plant unit at Curtis Creek and Stahl's Point, consisting of a main one and multistory building and several auxiliary structures, with machinery and electrical equipment for large capacity. Cost reported close to $1,000,000. Proposed to begin work soon.

OHIO—U. S. Engineer Office, Cincinnati, is asking bids (no closing date stated) for electrical equipment and transformer modifications at Mill Creek, including installation of additional equipment, with certain apparatus to be furnished by government (Contract No. 2-G, Mill Creek; Serial 33-015-46-67).

IDAHO—Bureau of Reclamation, Denver, Colo., will receive bids until June 4 for three 1,667-kva., single-phase, 60-cycle, oil-immersed transformers, each with single pole lightning arrester for 69,000-volt, three-phase ungrounded neutral circuit, for C-Line canal pumping plant, Payette Division, Boise project. Equipment will be installed by government (Specifications 1331).

MARYLAND—Consolidated Gas, Electric Light & Power Co., Baltimore, is reported planning expansion in Riverside steam-electric generating station, including installation of new turbine-generator of large capacity, high-pressure boilers and accessory equipment. Switchyard will be enlarged and extensions made in transmission lines. Entire project will represent a stated investment of close to $6,500,000.

OKLAHOMA—Municipal Light and Water Department, Blackwell, plans extensions and improvements in steam-electric power plant; also will install new water-softening plant for waterworks system. Entire project will cost about $221,000. Bond issue in that amount has been authorized. Black & Veatch, 4706 Broadway, Kansas City, Mo., are consulting engineers.

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REA Approves Loans for Rural Projects

The Rural Electrification Administration has recently announced approval of loan allotments totaling $17,262,000 to 71 co-ops in 25 states. The funds will be used to finance electric power facilities to provide service to farms and other rural establishments.

Included are the following:

ALABAMA—Tallapoosa River Electric Cooperative, Inc., Lafayette, $695,000.

COLORADO—Empire Electric Assn., Inc., Cortez, $190,000.

FLORIDA—Suwanee Valley Electric Cooperative, Inc., Live Oak, $428,000; West Florida Electric Cooperative Assn., Inc., Graceville, $135,000.

GEORGIA—Slash Pine Electric Membership Corp., Homerville, $284,000; Upson County Electric Membership Corp., Thomaston, $129,000.

ILLINOIS—Spoon River Electric Cooperative, Inc., Canton, $198,000.

IOWA—D.E.K. Rural Electric Cooperative, Inc., Estherville, $275,000; Southern Iowa Electric Cooperative, Inc., Bloomfield, $270,000; Sioux Electric Cooperative Assn., Orange City, $98,000; Woodbury County Rural Electric Cooperative Assn., Moville, $90,000; Plymouth Electric Cooperative Assn., LeMars, $50,000.

KANSAS—Central Kansas Electric Cooperative Assn., Inc., Great Bend, $295,000.

KENTUCKY—Owen County Rural Electric Cooperative Corp., Owenton, $610,000; Henderson-Union Rural Electric Cooperative Corp., Henderson, $560,000; Nolin Rural Electric Cooperative Corp., Elizabethtown, $490,000; Fox Creek Rural Electric Cooperative Corp., Lawrenceburg, $360,000; Meade County Rural Electric Cooperative Corp., Brandenburg, $180,000.

LOUISIANA—Bossier Electric Membership Corp., Bossier, $180,000; Jefferson Davis Electric Cooperative, Inc., Jennings, $82,000.

MAINE—Farm-Home Electric Cooperative, Inc., Patten, $94,000.

MICHIGAN—Top O'Michigan Rural Electric Co., Boyne City, $175,000.

MISSISSIPPI—Delta Electric Power Assn., Greenwood, $620,000; Capital Electric Power Assn., Clinton, $495,000; Central Electric Power Assn., Carthage, $454,000; Monroe County Electric Power Assn., Amory, $360,000.

MISSOURI—Central Missouri Electric Cooperative, Inc., Sedalia, $348,000; North Central Missouri Electric Cooperative, Inc., Milan, $281,000; Sac-Osage Electric Cooperative, Inc., El Dorado Springs, $268,000; Farmers' Electric Cooperative, Chillicothe, $199,000.

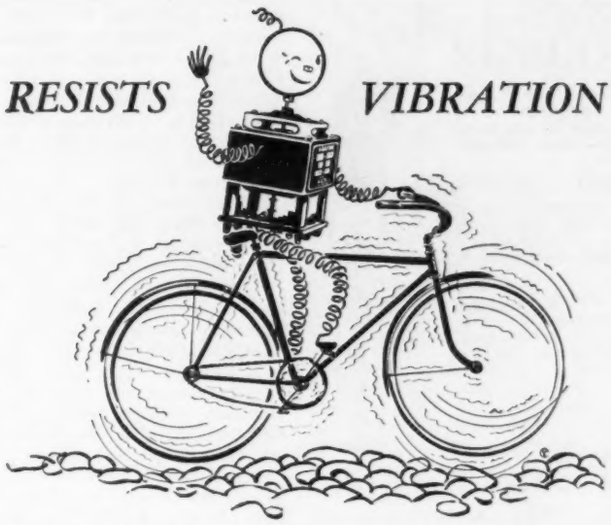
MONTANA—Fergus Electric Cooperative, Inc., Lewistown, $420,000; Big Horn County Electric Cooperative, Inc., Lodge Grass, $50,000; Big Flat Cooperative, Inc., Turner, $25,000.

NEBRASKA—Franklin County Rural Electric Assn., Franklin, $443,000.

NORTH CAROLINA— Lumbee River Electric Membership Corp., Raeford, $410,000; Davidson Electric Membership Corp., Lexington, $323,000; Surry-Yadkin Electric Membership Corp., Dobson, $289,000; Union Electric Membership Corp., Monroe, $193,000; Edgecomb-Martin County Electric Membership Corp., Tarboro, $50,000.

NORTH DAKOTA—Oliver-Mercer Electric Cooperative, Inc., Hazen, $500,000.

OKLAHOMA—Western Electric Cooperative, Inc., Kingfisher, $427,000; Northwestern Electric Cooperative, Inc., Woodward, $422,000; Indian Electric Cooperative, Inc., Cleve-



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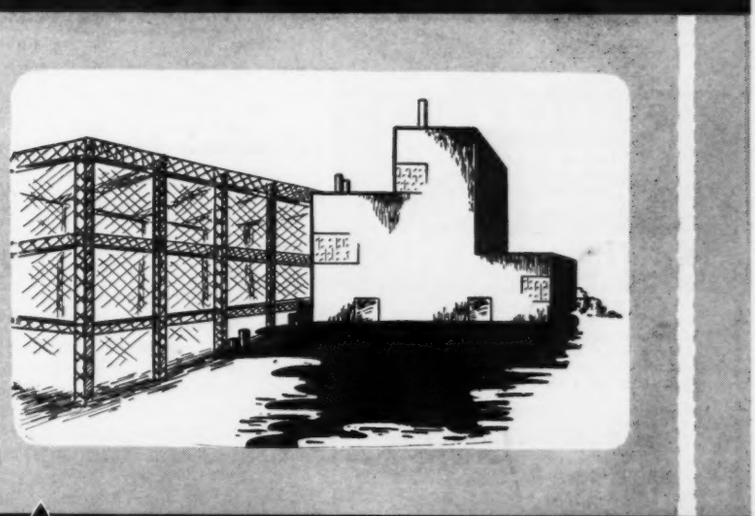

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land, $390,000; Central Rural Electric Cooperative, Stillwater, $115,000; Southwestern Electric Cooperative, Durant, $71,000; Kiwash Electric Cooperative, Inc., Cordell, $61,000.

SOUTH CAROLINA—Pee Dee Electric Cooperative, Inc., Darlington, $198,000; Newberry Electric Cooperative, Inc., Newberry, $147,000; Mid-Carolina Electric Cooperative, Inc., Lexington, $50,000.

SOUTH DAKOTA—Kingsbury Electric Assn., Inc., De Smet, $400,000.

TENNESSEE—Holston Electric Cooperative, Rogersville, $465,000.

TEXAS—Lower Colorado River Electric Cooperative, Inc., Giddings, $300,000; Rio Grande Electric Cooperative, Inc., Bracketville, $253,000; Lone Wolf Electric Cooperative, Inc., Colorado City, $230,000; Upshur Electric Cooperative Corp., Gilmer, $230,000; Houston County Electric Cooperative, Inc., Crockett, $200,000; McCulloch County Electric Cooperative, Inc., Brady, $180,000; Lyntegar Electric Cooperative, Inc., Tahoka, $150,000; New Era Electric Cooperative, Inc., Athens, $50,000; Gladewater Electric Refrigeration Cooperative, Inc., Gladewater, $10,000; Wood County Electric Cooperative, Inc., Quitman, $10,000; Camp Refrigeration Cooperative, Inc., Pittsburg, $5,000.

VIRGINIA—Southside Electric Cooperative, Crewe, $407,000; Central Virginia Electric Cooperative, Livingston, $75,000.

WASHINGTON—Pend Oreille Electric Cooperative, Inc., Newport, $130,000.

WISCONSIN—Clark Electric Cooperative, Greenwood, $175,000; Jump River Electric Cooperative, Inc., Ladysmith, $148,000; Dunn County Electric Cooperative, Menomonie, $125,000; Barron County Electric Cooperative, Barron, $100,000; Waushara County Electric Cooperative, Inc., Wautoma, $72,000; Richland Cooperative Electric Assn., Richland Center, $70,000.

•

G-E Adds 7 Credit Offices

General Electric Credit Corp. has reopened five local offices and established two additional ones, the better to serve General Electric and Hotpoint appliance dealers in the respective areas. The Pittsburgh, Cincinnati, Indianapolis, Kansas City, (Mo.) and New Orleans offices, closed during the war, have been reopened, and new offices have been set up in Minneapolis and Albany, N. Y.

•

Bendix to Issue Common

Bendix Home Appliances, Inc., is making a stock allotment to its common stockholders to raise funds to finance increased production, according to a registration statement filed with the SEC. The company registered 104,301 shares of common stock, with a par value of 33⅓ cents.

•

Dazor Firm Incorporates

Following the retirement of Harry L. Dazey as a partner, the Dazor Manufacturing Co., St. Louis, Mo., has been reorganized as a corporation. The business is continuing under the direction of Percy L. Read, the remaining partner, as president and general manager.

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Recent Rate Changes

OHIO POWER CO., subsidiary of the American Gas & Electric Co., and its affiliated Wheeling Electric Co. have been authorized by the Ohio Public Utilities Commission to reduce their residential and commercial rates $1,249,000 a year, effective with June 1 billings. Under the company's formula of basing commercial rates on the average monthly demand of the individual customer, no blanket comparison could be made between the old and new rates, nor could the percentage reduction be computed except on arbitrarily set up examples, utility officials said. Residential rates remain unchanged for the first 70 kw.-hr. per month, then drop one-tenth of a cent for the next 150 kw.-hr. and a full cent for the next 80.

EAST POINT, GA., domestic rates have been cut $10,000 a year under a reduction scheduled announced by George M. Sparks, manager of the city's light and water department. The city buys power from Georgia Power Co. The new rates include 25 kw.-hr. for $1.11 with a 10 percent discount on prompt payment of bills; the next 50 kw.-hr. at 3.33 cents per kw.-hr.; next 125 kw.-hr. at 2.22 cents per kw.-hr.; next 300 kw.-hr. at 1.11 cents per kw.-hr. All over 500 kw.-hr. at 1.39 cents per kw.-hr. There was no change in industrial power rates. The cut in rates will be effective on July 1 billings.

FLORIDA POWER & LIGHT CO. has announced a $2,500,000 state-wide cut in electric rates, chiefly beneficial to residential users and small stores and shops. The new rate becomes effective June 1. McGregor Smith, company president, said that more than 200,000 customers in 321 Florida communities and adjacent rural territory served by the company would be affected.

METROPOLITAN EDISON CO. has filed with the Pennsylvania Public Utility Commission new rates for electric service, effective July 1, which result in an annual saving to practically all classifications of customers of more than $1,000,000. The breakdown is as follows: domestic, $582,822; commercial, $197,922; industrial, $248,950, and municipal, $22,548. In each case the cost of electric service has been reduced by lowering the unit (kw.-hr.) cost of electric energy and by reducing the amount of electricity which the customer must use before gaining the advantage of the minimum rate per kilowatt-hour in the classification under which service is being furnished. In the domestic classification, for example, the minimum rate of 2 cents per kilowatt-hour will apply for all electricity used in excess of 100 kw.-hr. per month instead of 125 kw.-hr. under the old rate. Reductions in the cost of electric service to domestic customers vary according to the amount used each month. On 125 kw.-hr. per month, for which the charge was $5.10, there is a saving of 70 cents per month, or 14 percent, over the old rate. With the new, reduced rate the charge for 125 kw.-hr. will be $4.40. For 100 kw.-hr. per month the saving amounts to 45 cents, the new bill being $3.90. In addition to lowering rates for electric service, the new schedules simplify the company's rate structure by eliminating the General Service classification which was applied principally to commercial customers. All "General Service" customers will now be under the General Power and Light classification. The new rate schedules provide that bills for service shall be payable within ten days of the date of the bill. In the event the bills are not paid on or before the due date, a delayed payment charge becomes effective and the charge for service will be at the gross rate. "This reduction," O. Titus, president of Metropolitan Edison, pointed out, "comes at a time when the prices of most commodities are continuing to increase. We hope that the reduction in electrical-living costs will encourage our customers to take full advantage of the convenience and satisfaction that come from the full use of electrical equipment."

NORTHERN INDIANA PUBLIC SERVICE CO.'s new electric rate schedule, which will save customers more than $528,000 annually (ELECTRICAL WORLD, March 30, page 128), has been approved by the state Public Service Commission. A new low step has been added in the residential rate schedule which reduces the cost of electricity to two cents per kilowatt-hour for customers using in excess of 200 kw.-hr. a month. This new low step will provide cheap electricity for the use of many more appliances and services in the home. Dean H. Mitchell, president of the company, stated that in sharp contrast to the rising cost of every other commodity, the company has been able to maintain its low level of rates.

ARKANSAS-MISSOURI POWER CORP. has filed with the Arkansas Public Service Commission a proposed rate schedule in conformity with a recent company announcement of reduced rates (ELECTRICAL WORLD, April 27, page 130). Both residential and commercial rates are involved. The new rates represent a cut of approximately 13 percent in the average residential bill and approximately 7 percent in the average commercial bill. A rate schedule allowing an approximate 2 percent reduction in rural commercial rates also was filed. The reduction will amount to approximately $115,000 annually and will affect all towns in Arkansas and Missouri serviced by the company, James Hill, Jr., president of the company, stated.

NEW MEXICO POWER CO. has been ordered by the state Public Service Commission to reduce Santa Fe electric rates $106,170 a year. The order is effective on June 1. The rate reduction is confined to the electric utility, the commission finding that the water department was operating on a return of less than 5 percent of the investment. The commission further ordered that the company proceed with improvements in its electric and water departments as outlined at a hearing held last month.

HOLSTON RIVER POWER CO. has revised its rate schedules, effecting a saving to customers estimated at $17,800. The new rates became effective on all bills rendered on and after May 1.

PUBLIC SERVICE CO. OF COLORADO has put into effect new electric rate schedules for Boulder, Colo., power customers, reducing domestic consumers' bills more than 13 percent. For the 3,655 domestic users, the reduction will be $15,059 annually, or 10.43 percent, and for all types of users there will be a $34,775 reduction, or 11.14 percent.

SIERRA PACIFIC POWER CO. has announced reductions in electric rates for Lake Tahoe and Truckee areas, amounting to $16,500 annually in California, with the combined reduction for both California and Nevada customers placed in excess of $20,000 a year. The schedules have been approved by the Nevada Public Service Commission and the California Railroad Commission. The slash is the first of a series of reductions contemplated for domestic and commercial customers in areas served by Sierra Pacific in Nevada and California.

SASKATCHEWAN (CANADA) POWER COMMISSION will reduce on June 1 the maximum cost

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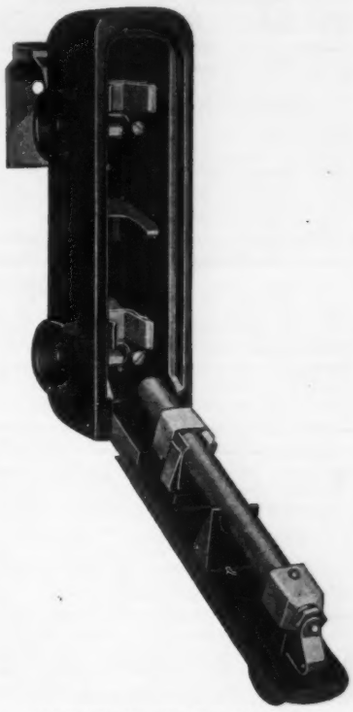

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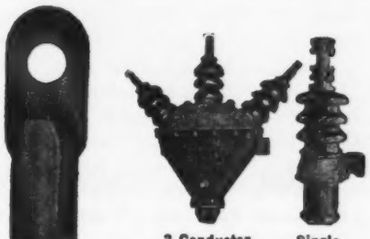

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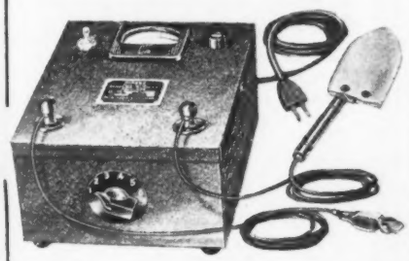

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of electricity to ten cents a kilowatt-hour, J. L. Phelps, Saskatchewan National Resources Minister, has announced. At the same time, Mr. Phelps announced a consolidation in the rates paid by consumers of the Saskatchewan Power Commission, Dominion Electric Power and Prairie Power systems. Commencing June 1, approximately 90 percent of the communities served by these systems will have a uniform rate schedule. The new rate schedule, which will cover residential and commercial lighting and some power rates, will mean an estimated reduction in revenues on the combined Power Commission and Dominion Electric Power systems of from $110,000 to $120,000 per year.

•

Manufacturers Issue Earnings Reports

Among the electrical manufacturing companies that have recently reported on earnings are the following:

SQUARE D—Net sales, 1945, $40,300,000, approximately the same as in 1944, but a decrease of 11.6 percent from the all-time peak in 1943. Profit in 1945 totaled $1,621,462, a decrease of 19.4 percent from earnings for 1944, which totaled $2,011,464. The 1945 earnings were equivalent to $3.53 per share on the 459,160 common shares outstanding at December 31, 1945, compared with 1944 earnings of $4.58 per share on the 421,360 common shares outstanding at December 31, 1944.

REYNOLDS METALS—Including consolidated subsidiaries, earned $4.03 per share of common stock in 1945, against $2.71 per share in 1944. Net profits after taxes were $4,396,187 in 1945, against $3,045,818 in 1944, the last full war year. Net profits before taxes were $8,364,487 in 1945, compared with $11,815,158 in the previous year.

WALTER KIDDE & CO.—Including domestic subsidiaries, net income $315,681, equal to $1.36 a common share, against $1,367,494, or $6.37 a share in 1944; net sales, $34,644,492 against $49,433,595.

•

J-M Expansion Program

Johns-Manville Corp. will spend approximately $50,000,000 on an expansion program which will start this year and continue to 1950, Lewis H. Brown, president, said at a recent stockholders' meeting.

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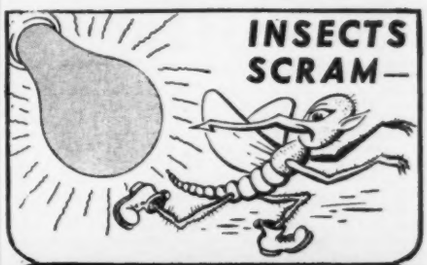

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P-259, Electrical World
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Large engineering consulting firm desires Industrial Lighting Engineer familiar with fluorescent application and modern industrial lighting. State experience. Write Box

P-260, Electrical World
330 West 42nd St., New York 18, N. Y.

POSITIONS VACANT

WANTED: LARGE Public Utility serving middle west with electrical and gas service has an opening for a young graduate electrical engineer with training or experience in property accounting. Position offers permanent employment, good salary and opportunity for advancement. State age, education, details of experience and salary desired. Include photo. P-214, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

POWER SALES Engineer. Wanted between the age of 30 and 40 with a degree in electrical or mechanical engineering. Must be experienced in power sales with a thorough knowledge of steam and diesel competition also the application of electric power to industry. Please forward resume of educational background, experience, salary expected and enclose a recent photograph to P-251, Electrical World, 330 W. 42nd St., New York 18, N. Y.

LIGHTING SALES Engineer. Man between the age of 30 and 40 experienced in promotion of lighting sales to commercial and industrial customers for a public utility. Should be, preferably, a college graduate or have training in a technical school. If interested please forward resume of educational background, experience, salary expected and enclose a recent photograph to P-252, Electrical World, 330 W. 42nd St., New York 18, N. Y.

WANTED: ADVERTISING Copywriter. Large middle-west light and power company has opening for man experienced in copy, production and layout (roughs). Permanent position. Opportunity for advancement. Give age, experience, salary requirements. P-253, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

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POSITIONS WANTED

ELECTRICAL ENGINEER: age 40, married, 17 years experience, power plant, substation, testing and maintenance, supervision and operation, industrial plant layout. Transmission and distribution studies. Desires position with established company. PW-242, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

LOAD & Switching dispatcher. Age 40, 20 years experience. Want related work, desire change, will go anywhere. PW-254, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

ELECTRICAL SUPT. twenty-four years experience operation, maintenance, construction, substations, hydro and steam plants. Ability to handle men and labor relations. References readily available as to ability, character and personality. Age 42, married. PW-261, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

WANTED

ELECTRICAL ESTIMATOR

Large engineering and construction organization desires Electrical Cost Estimator. Opportunity for man with substantial background of electrical engineering and estimating for modern steam plants, transmission lines and substations. Applicants state age, education, experience and salary.

P-228, Electrical World
330 West 42nd Street, New York 18, N. Y.

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ELECTRICAL ENGINEER

For Power Plant Design
Must have Public Utility Experience

WESTCOTT & MAPES, INC.
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POSITIONS WANTED

ELECTRICAL ENGINEER: Two years G.E. test course, on turbines, motors, generators, switchgear, transformers and control; two years plant electrical construction engineering, distribution, lighting, maintenance. B.S.M.E. degree, age 25, married. Prefer foreign electrical engineering position. PW-262, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

ELECTRICAL OPERATING engineer, age 40, degree B.E.E., 20 years experience, desires position as meter or substation superintendent. PW-263, Electrical World, 330 W. 42nd St., New York 18, N. Y.

ENGINEERING AND operating executive: 20 years experience in operation, design, and construction of public utility electric facilities, transmission and distribution power supply, economic studies, costs, equipment specification and purchase. Organizational ability. Registered. Age 43, married. Desires responsible position in public utility, consulting or large industrial firm. Position offered must have a future. West or South preferred. PW-264, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

FACTORY IN England? If you are planning one, this man, as a member of your organization, would be of great value to you. PW-266, Electrical World, 330 W. 42nd St., New York 18, N. Y.

ELECTRICAL ENGINEER: B.S' degree, 26, single. Experience: 3 months inspection and inventory with public utility company; over 5 years design and liaison with one of the outstanding engineering departments in U. S. Prefer position with company doing manufacturing or construction work in foreign country. Salary not important, experience is. PW-267, Electrical World, 520 N. Michigan Ave., Chicago 11, Ill.

SELLING OPPORTUNITY WANTED

ELECTRICAL ENGINEER: opening office South Carolina desires contact with manufacturers leading to representative as sales engineer in south east. SA-268, Electrical World, 330 W. 42nd St., New York 18, N. Y.

BUSINESS OPPORTUNITY

ANALYST, ATTORNEY, financial and reorganization experience, now with Federal Commission, desires utility, investment or industrial connection in West. Part time or consulting arrangement considered. BO-269, Electrical World, 330 W. 42nd St., New York 18, N. Y.

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RW-258, Electrical World
330 West 42nd St., New York 18, N. Y.

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(Additional Wanted ad on opposite page)